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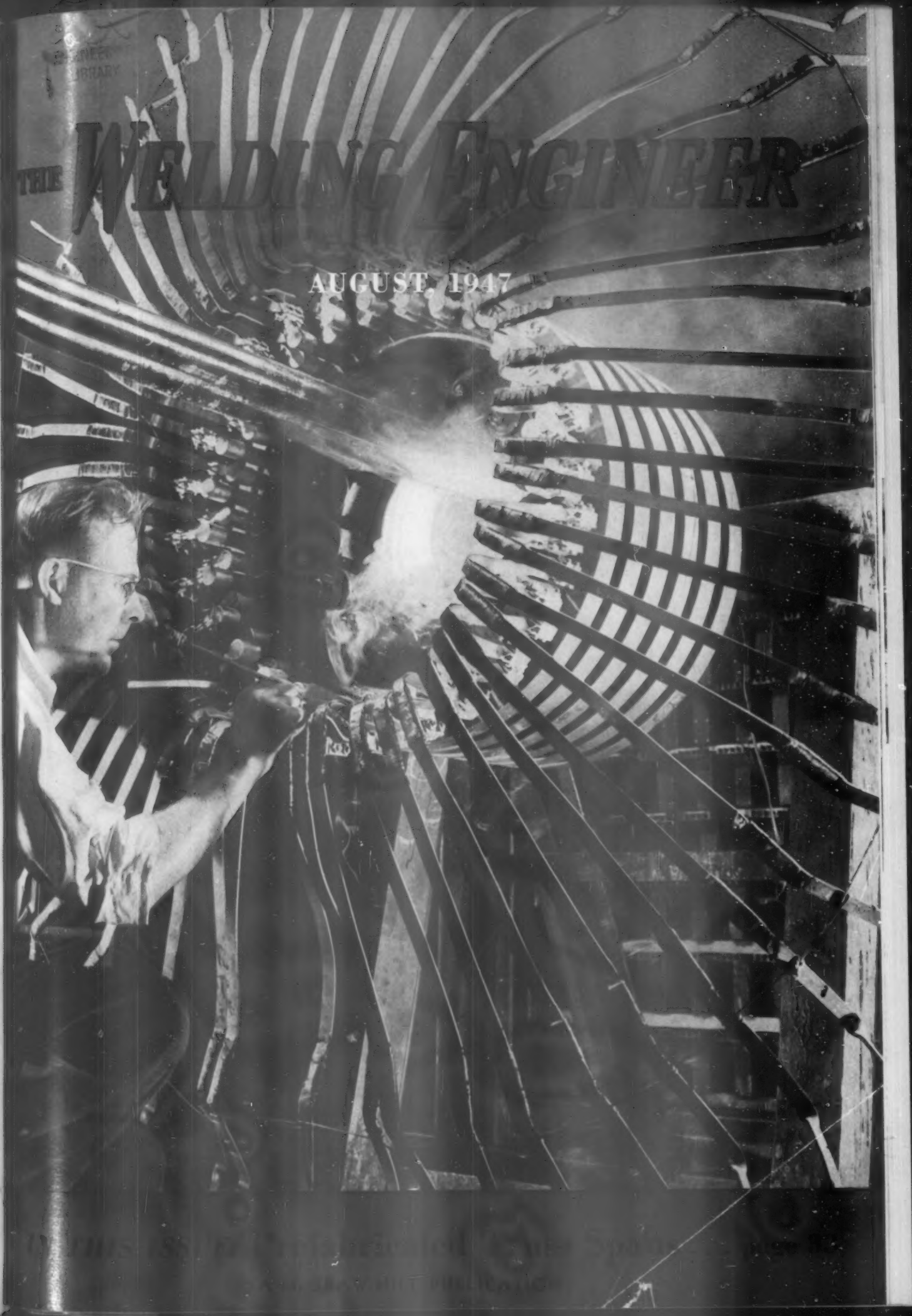
THE WELDING ENGINEER

AUGUST, 1947



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THE WELDING ENGINEER

THE WELDING ENGINEER, *with which is combined The Acetylene Journal*

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TOOL OF THE MONTH

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THE WELDING ENGINEER

AUGUST, 1947

Why Not More Welded Homes?

TWO YEARS have passed since our armies silenced the big guns of the axis powers. It took the allied forces six years to perform this gigantic task, and they were trying times with sacrifices being made on every hand. During those years of emergency, all industries pulled together to produce the materials necessary to wage war. Welding was in the fight, too. The best modern industry could offer was placed in the hands of our fighting men, making them the best equipped army in the world. No one could afford to pull any punches, and no one did.

What a difference today! Our youths offered their lives freely for a free world. *We* live in that world, but where do *they* live?

The plight of many veterans is pitiful. They are now faced with a real emergency of their own—that of finding places in which they and their families can exist. How quick we are to forget them in this fast moving world! Now that the war has been won, too many people blandly assume that since housing is not a problem to them it isn't a national problem. This slaphappy attitude seems to be a part of the American way of life.

The housing problem has also become a political football, and the outlook for improvement is not encouraging. Proposals have been made, only to be buried in some pile of bungling administration red tape—not to see daylight, if ever, until sometime before another election.

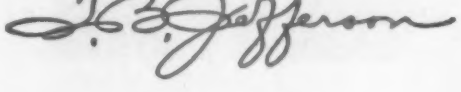
When attention is called to the fate of the veterans who lack houses, we sometimes hear, "Let 'em buy a house! They're getting bonuses and other benefits." Yes, they're getting benefits, but these are not houses.

Of course some will answer, "There are plenty of homes for sale." True, a $7,000 home (1941 price) can generally be had for $12,000, occasionally for as little as $10,000. What percentage of our veterans are in the financial position to meet the demands imposed by the price tags of these houses? One tenth of one per cent?

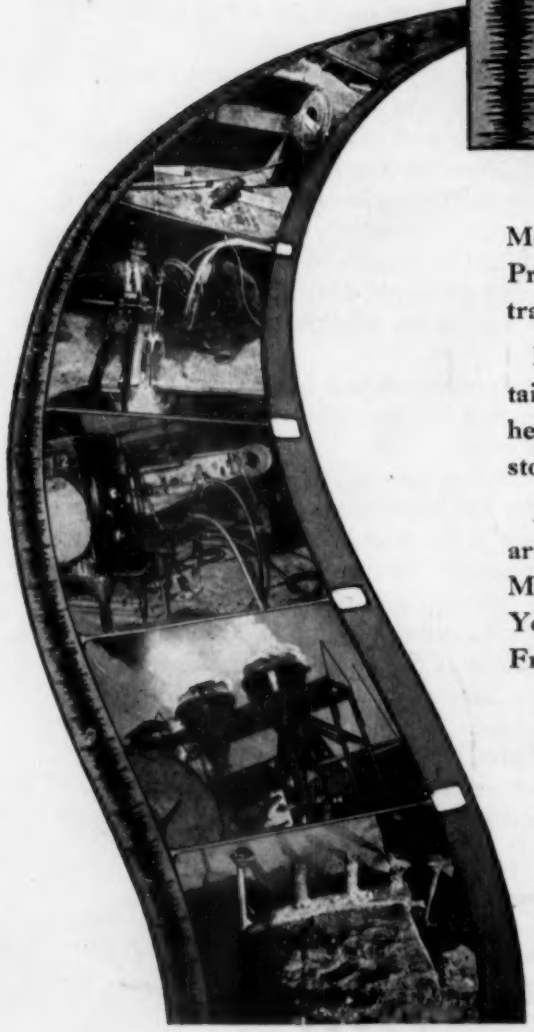
There is a way out of the housing shortage, though, and one farsighted home builder on the East coast has shown the way by adopting welding as a means of construction.* In little over a month's time he built dozens of strong, fireproof modern houses priced so that veterans would be able to own them. He isn't in business for his health, either—he's making money.

The comparatively low sale prices of these homes has been made possible by welded prefabrication of steel frames. Why not acquaint more builders with the many advantages of welded construction? This emergency presents another opportunity for welding—let's take full advantage of it.

* See "Housing on an Assembly Line," page 34, THE WELDING ENGINEER, June, 1947.



MASS PRODUCTION OF MASSIVE PARTS



Metal & Thermit's new sound and color film, "Mass Production of Massive Parts", is an educational portrayal of the Thermit Welding Process.

Both interesting and helpful, this film shows the details and advantages of the process for fabrication of heavy parts of steel mill equipment, railroad rolling stock, ships and similar work.

Ask your nearest M & T representative how you can arrange for a *free* showing. Running time 24 minutes. Metal & Thermit Corporation, 120 Broadway, New York 5, N. Y., Albany, Chicago, Pittsburgh, So. San Francisco, Toronto.

THERMIT WELDING

PREFABRICATED TRUSS SPANS

★ CONSTRUCTION

Welding was indispensable to the construction of various members of the new bridge erected across the Hawkesbury river at Sydney, Australia. Full details of the prefabrication procedures for the two 440-ft truss spans are given here.

BY H. BOWDEN FLETCHER

A NEW steel bridge erected to eliminate the road traffic bottleneck at the Peats Ferry crossing of the Hawkesbury river between Sydney and Newcastle, Australia, makes effective use of prefabricated welded spans. This bridge is 1,985 ft long. From the Sydney side, going toward Newcastle (Fig. 1), it consists of one 43-ft plate girder span, two 440-ft truss spans, eight 90-ft plate girder spans and eight rolled-beam spans having a total length of 320 ft.

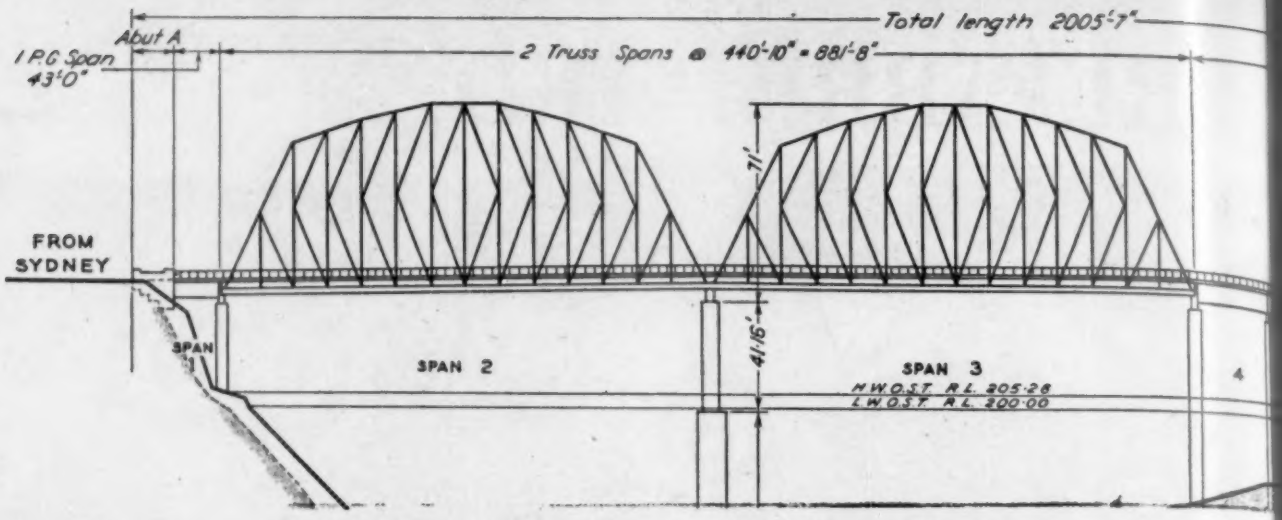
Truss Span Specifications

The feature of greatest interest to American readers is the welding of the two truss spans, which are considered to be the longest of their kind in the world. Each of these spans measures 440 ft, 10 in. by 68-ft at the center post and weighs approximately 800 tons. The specifications issued by the Main Roads Board of New South Wales required the spans to be prefabricated and erected on the grounds of the contractor, the Clyde Engineering Co., of Sydney, before they were transported to the erection site. The trusses were not completely welded. The sections forming the various members were fabricated by welding, but the connection of the members at the site was accomplished by riveting.

The specifications provided that each weldor employed be required to make a test weld of the form and dimensions dictated by the supervising engineer of the Main Roads Board. This specimen, on being tested to destruction, was required to have an ultimate strength of not less than four tons per inch of weld.

Building Top Chord

As shown in Fig. 2, the truss spans consist of K-system trusses. The top chord was built up in an H-section. At the two center panels it was formed from 30-in. wide by 2-in. thick flange plate about 32 feet long with a web of 12-in. by 1¼-in. plate. The other top chord panels varied slightly in section.



The plates forming the top chord members were straightened and then marked off and edge planed to the required width. The first problem was the effect of the fillet welds on the plate and how the job should be jigged to prevent distortion. The 2-in. flange plates of the top chords, bearing on the 1¼-in. web with ⅜-in. fillets, were considered too thick to be affected by the welding heat.

A jig was made by welding three 24 by 7½ in. rolled beams flange to flange to form a table, 22½ in. wide, which was supported on rolled beams. On the top face of the table two channel sections were laid with toes facing each other to carry the web plates. Angle braces were also welded to the table at approximately 2-ft intervals to form the sides of the jig for locating the flange plates. This jig is very similar in design to that shown in Fig. 3, made for the plate girders.

The web plate was located at the top of the channels in its correct position by arranging packing pieces to make up for variations in the depth of flanges. The flange plates, suitably marked to show the position of the web plates relative to the center flange plates, were lowered into the jig and were brought up to the web plates by means of tapered wedges. Before tacking the web to the flange plates, the relative position of both was checked by a gauge to insure that flanges were square and at right angles to the web. The contacting surfaces of the web and flanges were also checked to assure that they were in contact. The tolerance allowed was approximately 0.005 in.

The web plate of the member was tacked up on one side to the flange plate. The unit was then taken from the jig, turned over, replaced in the jig, checked with the squaring gauge and tacked on the other side. Before proceeding with the final welding, stay bars were cut to the exact length and inserted at 2-ft centers to keep the flanges at the correct width.

The chord was removed from the jig and tilted at the angle required to form a natural vee for welding (Fig. 4). Two weldors were employed on each fillet; they started from the center and worked—away from each other—towards the end. The back-step method was followed; *i.e.*, welding one bead, missing two, welding one miss two and so on to the end of the fillet. The member was then turned over and positioned so that the welding of the first complete bead on the opposite side of the web plate could be finished. The first bead on number three side and then the bead on four side were applied and completed as in the weld on number one fillet. The weldors then returned to the center and applied number two bead from the center out, maintaining the system of welding one and missing two, which was adhered to on all welds.

Thorough inspection was made at the end of each welding bead before proceeding with the building up of the larger fillets and this, of course, involved the thorough cleaning of each pass. After the first top chord had been completely welded, very slight distortion could be found. The maximum amount of dishing was 3/16 in. on the thinnest flange (30 inches by 1¼ in.)

Fig. 2—One of the two 440-ft truss spans being floated into position. The structural members were prefabricated by welding but riveted to each other

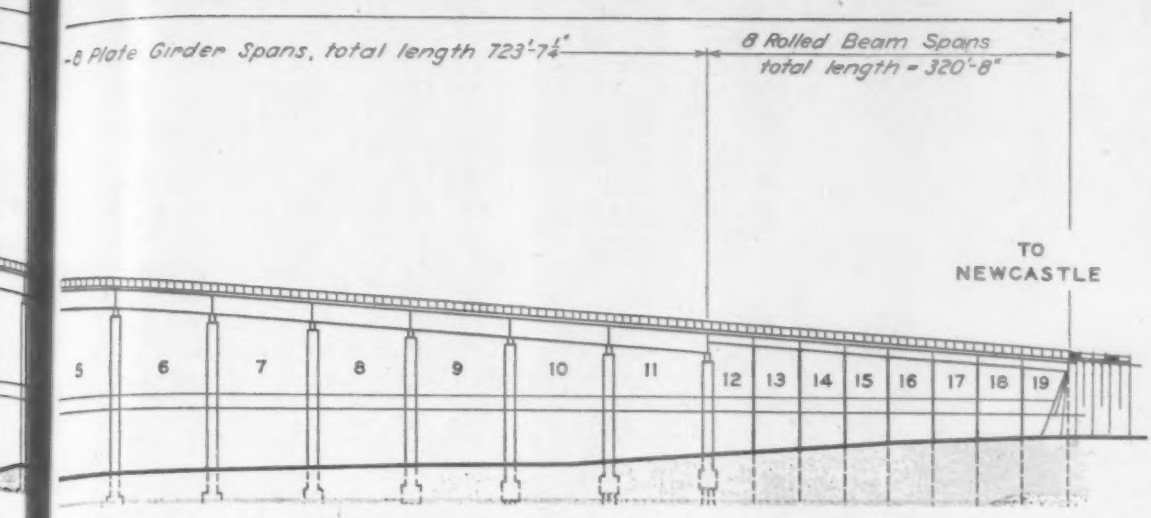


Fig. 1—Diagrammatic elevation of the new Hawkesbury river bridge, New South Wales, Australia, showing the lengths and types of the spans

and only ⅛ in. for the thickest flange plate (30 by 2 in.). Small though this distortion was, it caused some complications at erection stages. It was found that when the gusset plates were applied to the chords for riveting, they naturally followed the set of the flange plates. This was overcome by jacking out the chords at the gussets until the members were at the correct width and parallel to the axis of the web.

After welding the member, it was handed over to the marker off, who marked the cutting lengths and tack holes for drilling to carry the gusset plates. The tapes used for marking off were checked to standard measurement, carried out by means of a standard length set on concrete blocks on the floor of the shop. The 100-ft set-out was checked by government surveyors.

Bottom Chords

The bottom chords were formed in the shape of an inverted U, with flange plates being welded to the bottom legs. Web plates were 24 in. wide and varied in thickness from 1¾ in. at the three center panel to 1 in. thick at outer panels. The horizontal plates were 6 by ⅞ in. The bottom chord members were from 30 to 34 ft long.

The plates of the bottom chords were straightened and machined to size in a manner similar to that used for the top chord plates. The flange plates were placed on a jig which gave them a set of 3 in. in the center. The web plates were then placed on top of the flange plates and tacked in position with a 3-in. set. The jig was similar to the one previously described except that stop plates were welded to it at various intervals to give the necessary curvature to the flange to overcome distortion.

After the plates had been tacked, two weldors began the final welding. They worked from the center out, on opposite sides, in order to fully balance the welding. The same principle of weld one miss two was employed as in the top girder.

When the web plates and flange had been welded, the units were removed from the jig, and the horizontal plate sections were positioned and tacked. The bottom chords had diaphragm or stiffener plates inside the chord. The positions of these were marked, and the plates were fitted and tacked into position to the horizontal plate. The units were then removed to another jig and positioned to form a natural vee before the inside welding of the chord was completed. The bottom chords were welded on the inside only, the horizontal plate being joined to the flange plates by means of ⅜-in. fillet welds.

Before continuing the welding, the legs of the chords were set out 3 in. by hydraulic jacks to compensate for contraction in stresses; stays were also inserted to keep the flange plates apart at the bottom during welding. When the welding was finished inside the bottom chord, the stays were removed and the side plates came back to the diaphragm. The members in most instances finished correctly and required no postweld straightening.

Fig. 3—Jig made for the tack welding of the plate girder. Similar jigs were constructed for the top chord sections and the other members

After release of the side plates, the diaphragms were completely welded. The bottom chords then went to the marker off to be marked to length and for location of tack holes for the gusset plates. Specifications called for 75% bearing surface on all butt joints on the chords; the members were flamecut to obtain this surface, allowing ¼ in. for machining. The butt joints for the required bearing

Fig. 4—Finish welding was done by two weldors, working on opposite sides of the member. A skip-welding procedure was used to avoid distortion

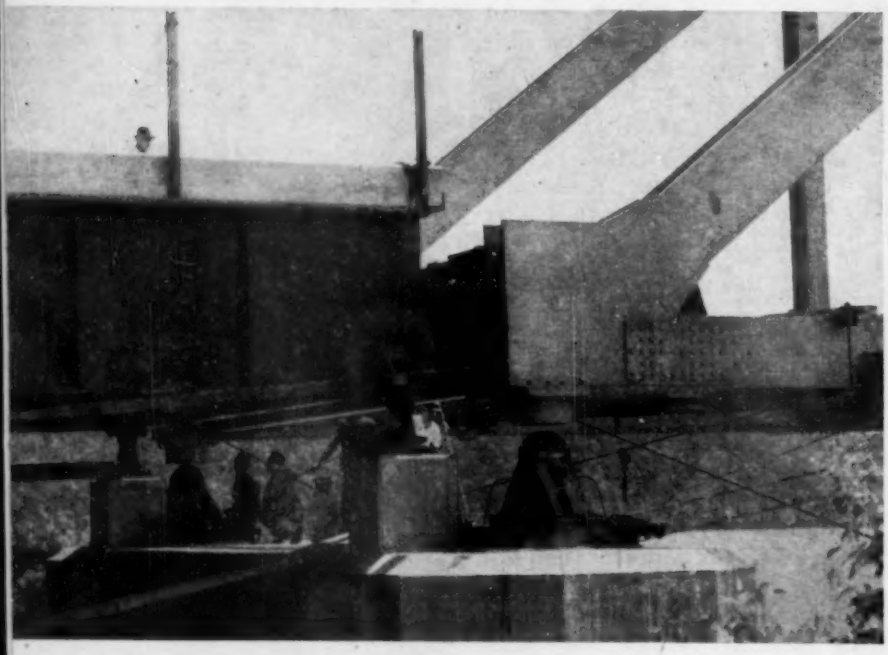


Fig. 5—Detail of end post and bottom chord gusset plate. Note the bearings on which the bottom chord members of the truss span are seated

surface were milled on a special machine, with good results as the joints were almost perfect. An excellent view of the bearings as the truss span is seated into position is provided by Fig. 5.

The chords were joined and assembled by means of tack holes, and all gussets and packers were located by means of tack holes for multiple drilling. When the two sections of chord had been united, they were checked for length, camber and straightness over the two sections. The members were not moved from the assembly position for drilling, which was done on the spot by a portable drilling machine to insure perfect union.

End-Post Construction

Details of the end post and bottom chord gusset plate may be seen in Fig. 5. The end post, a member weighing 24 tons and measuring 82 ft long, is of H-shaped construction similar to that of the top chords. Flange plates are 30 in. wide by 2 in. thick, and web plates are 1½ in. thick. The gusset plate dimensions are 2 in. thick by 65 in. by 4 ft 9 in. The gusset was butt welded to the end post (Fig. 6).

All fillet welds on the end post were ⅜ in. thick, and the same welding procedure was used as on the top chords. The flange plates were tacked to the webs and the member positioned for welding. The bottom chord gusset plate was then butt welded at each end post, and all welds were ground flush without leaving any tool or grinding marks.

The vertical posts and diagonals were of I-section design. The top diagonals consisted of 18 by 1 in. flange plates welded to 14 by ⅜ in. web plate at the ends of the spans and 16 by ½ in. flange plates welded to 15 by ½ in. web plates at the center post. The chief problem in the construction of these members was to eliminate hogging of the flange plates and to keep the members straight.

The plates were straightened and leveled to make them perfectly flat, and all web plates were machined. A jig similar to that used for the top chord sections was made, and the members were tacked in exactly the same way and under the same procedure. After the web had been tacked to the flanges, the members were transferred to the welding jig. Along the center of this jig there was tack welded a flat plate of predetermined thickness and about 1 in. wide. Plate clips driven over the toe of the jig and the flange plates of the member gave the flanges plates the required set-off. When the member had been securely fastened to the jig, two weldors began to work opposite each other in the method previously described. The welds were all ¾-in. fillets and the beads were laid intermittently. The only problem involved with this construction was to ascertain the amount of offset required in order to overcome hogging.

Cross Girders

The cross girders, of which there were 15 to each truss, measured 4 ft 2⅜ in. deep by 31 ft 8 in. long. The web plates at panel point LO were 4 ft 2¾ in. by 5/16 in. by 3 ft 8 in. and the flange plates were 9 in.

wide and 1⅜ in. thick with web stiffeners 4 in. by ½ in. thick and spaced at 4-ft centers. Again the same assembly procedure for tacking was adopted. The web plate was located in a jig to set it at the correct height relative to the depth of flange. The flange plates were brought up to the web plates and securely wedged in and tacked. Web stiffeners were then fitted and tacked in position on one side. The girder was removed, turned and replaced in the jig to allow the tacking on the other side and the fitting of stiffeners. Two weldors were employed, one on either side, working directly opposite each other and from the center outwards towards the ends. Skip welding was again employed. When one flange had been finished, the girder was turned over and the other flange was completely welded. As soon as both flanges were ready, the girder was placed in the horizontal position and the stiffeners were welded by the same back-step method. Welding commenced at the center stiffeners, the end ones being left until all welding had been completed.

Fig. 6—This butt weld joins the flange plate of the end post to the bottom chord gusset. Both of these plates are of 2-in. thickness

Fig. 7—Butt-welded flange plates for the plate girder. The center plate is 2 in. thick, the two end plates 1¾ in. thick. Note the triangular reinforcing plate which brings both sides of the joint to the same level

Plate Girders

The final members dealt with were the 16 plate girders. Each of these measured 88 ft, 6½ in. center-to-center of bearings and 7 ft 3½ in. deep over the flanges. The web plates were formed by butt welding together three plates 84 in. wide, 9/16 in. thick and 30 ft long to form one plate. The plate edges were prepared for double-vee joints.

The flange plates consisted of a center plate 16 in. wide by 2 in. thick by 33 in. long and two end plates 16 in. wide, 1¾ in. thick and 28 ft 6 in. long. These plates were welded into a continuous flange plate before any tacking or welding to the web plates was done.

Triangular reinforcing plates were welded at the butts (Fig. 7) to bring the end-plate sides of the joint to the thickness of the 2-in. center plate. The butts on the flange plates were also reinforced on the outside edges by beads twice the width of the top vee and giving 10% greater thickness than the adjacent parent metal.

The intermediate web stiffeners were made of 6 by ½ in. flats, 7 ft long, at 4 ft 11 in. centers, and the end web stiffeners comprised 7½ by 1¼-in. flats, 7 ft long, on the inside. All fillet welds on the 90-ft plate girders were ¼-in. fillets except on the center and end stiffeners where ⅜-in. fillets were used. The method of assembly for the plate girders was exactly the same as the cross girders. A jig (Fig. 3) was constructed to locate the web plates at the correct height. Angle posts located the flange plates and wedged them up to the web plates. Flange plates were tacked to the web plates on one side, and the web stiffeners were then fitted and tacked (Fig. 8).

How the finished bridge looks is shown by the picture at the beginning of this article.

Fig. 8—Tack welding the plate girder components. This assembly was accomplished in the jig shown in Fig. 3

★ PRODUCTION

Batting out Bug Bombs

Special six-station fixtures index automatically for the rapid assembly of one-shot, one-room DDT insecticidal bombs by projection welding. Welders powered by storage batteries are used for consistent quality.

BY ATHEL F. DENHAM

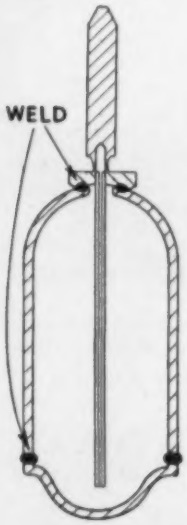


Fig. 2—The stem and assembled capillary tube are projection welded to the nose. Breaking the stem releases the insecticide. The cap is welded at the bottom to seal the pressure gas in the bulb

FLIES, mosquitoes and others of the summer's winged pests are dying in gratifying numbers as a result of the latest weapon in insect warfare—DDT bombs of the one-shot variety that retail for only a few cents each. To use one, the stem is merely broken off, which releases the insecticide and allows it to be sprayed out under internal pressure. One bomb holds enough DDT to fumigate a large room.

Manufacture of these bombs is accomplished at Manufacturing and Tool Corp., Burlington, Vt., by employing eight multiple-electrode indexing projection welders.

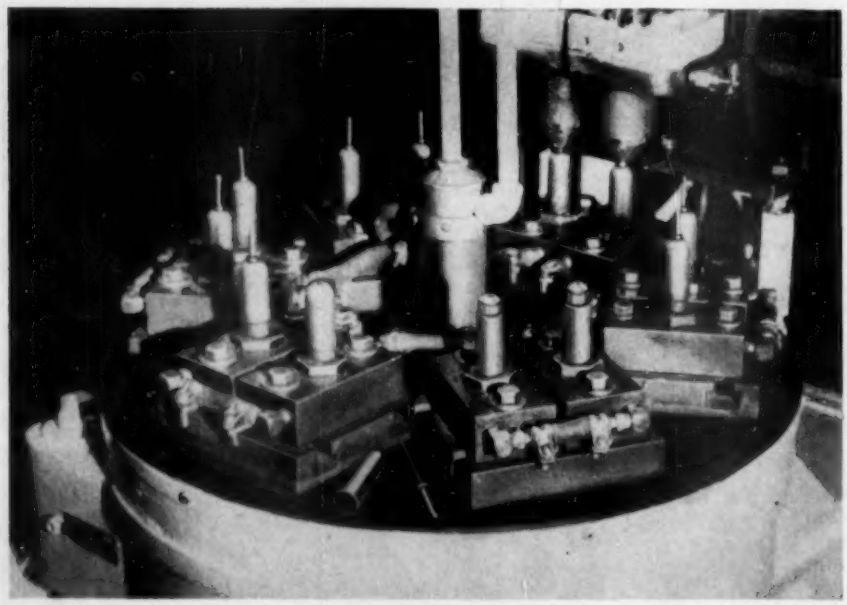


Fig. 3—Two stem-and-bulb assemblies are welded at a time in this six-station indexing machine. Welding is done at station at right background

How this array of machines looks in operation may be seen in Fig. 1. The sketch (Fig. 2) shows the two welding operations that are necessary.

PRODUCTION STEPS

The first step is to weld the stem assembly to the nose of the bomb. The cartridge is then filled, and the cap is welded in place to seal the bottom of the bomb against internal gas pressure. Both of these operations are performed by projection welding, using storage-battery-operated welders. Advantage of the battery-type machines is said to be in their consistency of operation. The multiple-station machines are designed so as to eliminate the human element from the quality of the finished product.

The capillary stems are cut off to length in an automatic, hopper-fed machine, and the tube is assembled to the neck stem in another automatic machine, which inserts the tube into the hole in the stem and stakes it in place. The stem assembly and bulb are next joined on a multiple projection welder having a six-station indexing table.

Fig. 3 shows two bulb-and-neck assemblies in welding position (right background of photo). In the adjoining station clockwise are two tube-and-stem assemblies that have just been welded and are ready to go to the next machine. Clockwise again may be seen the two lower electrodes after removal of the welded bulbs.

Continuing clockwise, we find that a new bulb has been placed over each electrode, and one stem assembly has been put in place. In the fourth station the stem assembly has been added to the

Fig. 1—General view of welder array at Manufacturing and Tool Corp., Burlington, Vt. These complex machines are used for the assembly-line production of bug bombs sold for just a few cents each

Photos and sketch courtesy Progressive Welder Co.

second electrode, and in the fifth station both assemblies are ready for welding.

From the welding fixture shown in Fig. 3, the bulb-and-stem assemblies leave with one open end to allow them to be filled with insecticide and gas. This is done on the second indexing machine (Fig. 4), which also has six stations but handles only one bomb at each station.

Filling and Sealing

The bulb as it comes from the previous operation is dropped stem downward into a chuck in the first station (front center of Fig. 4). At the next station (clockwise) it is automatically given a measured charge of DDT mixture. At station No. 3 the pressure medium is put into the bulb, and at station No. 4 the operator places a cap on the filled tube. At station No. 5 the cap is welded to the bulb, sealing in the DDT and pressure medium before the latter has had an opportunity to vaporize. Finally the fully assembled bomb reaches station No. 6, where it is released from the chuck and sucked out by a vacuum system into an overhead conduit.

From the overhead conduit the bombs drop by gravity onto a short conveyor (see Fig. 1) between the two rows of welders. This conveyor runs submerged in water in order to bring the bombs to a predetermined temperature. The latter are then taken by a cross-conveyor through an oven, which heats them to 180 F in order to expand the gas in each bulb.

Should any bomb leak, some of the gas it contains will escape and so decrease the weight. Final inspection, therefore, is made by weighing each bomb on an electronic scale that is sensitive to plus or minus 0.2 grams. Bombs of the correct weight automatically pass on to the next station, where they are hung on a conveyor which takes them to a spray booth. Defective bombs are automatically rejected and drop into a pan. The electronic scale is able to weigh up to 150 bombs per min.

Manufacturing and Tool Corp. also produces larger-size insecticide bombs, each containing some 70 cc of DDT mixture. A fire extinguisher is likewise weld-assembled by a similar process with the aid of battery-operated welders. Because of the larger size of the fire extinguishers, these machines are of lower productive capacity per hour. The company plans to round out its line of gas-filled tubes by adding the manufacture of deodorant, perfume and medicinal bulbs.

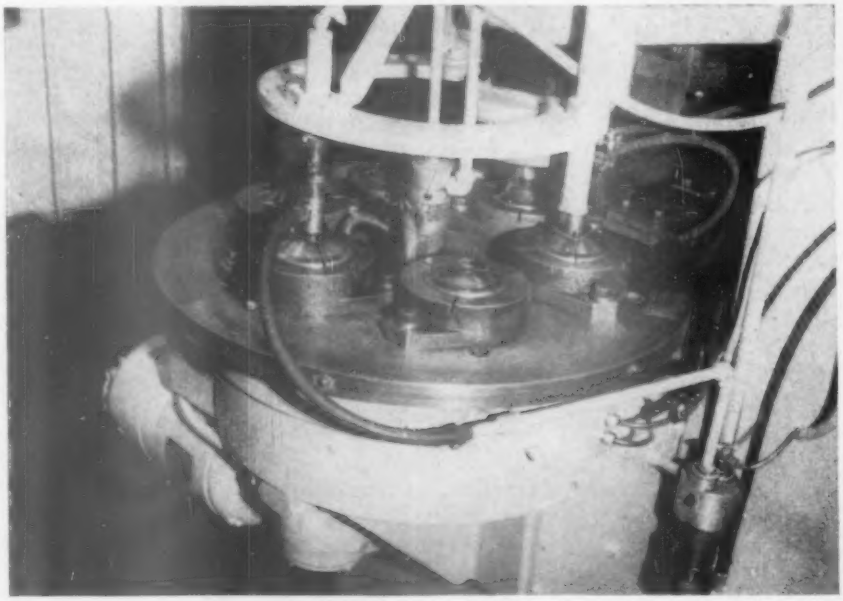


Fig. 4—The bombs are filled with DDT solution and pressure medium, then capped and sealed by welding at this ingenious six-station fixture

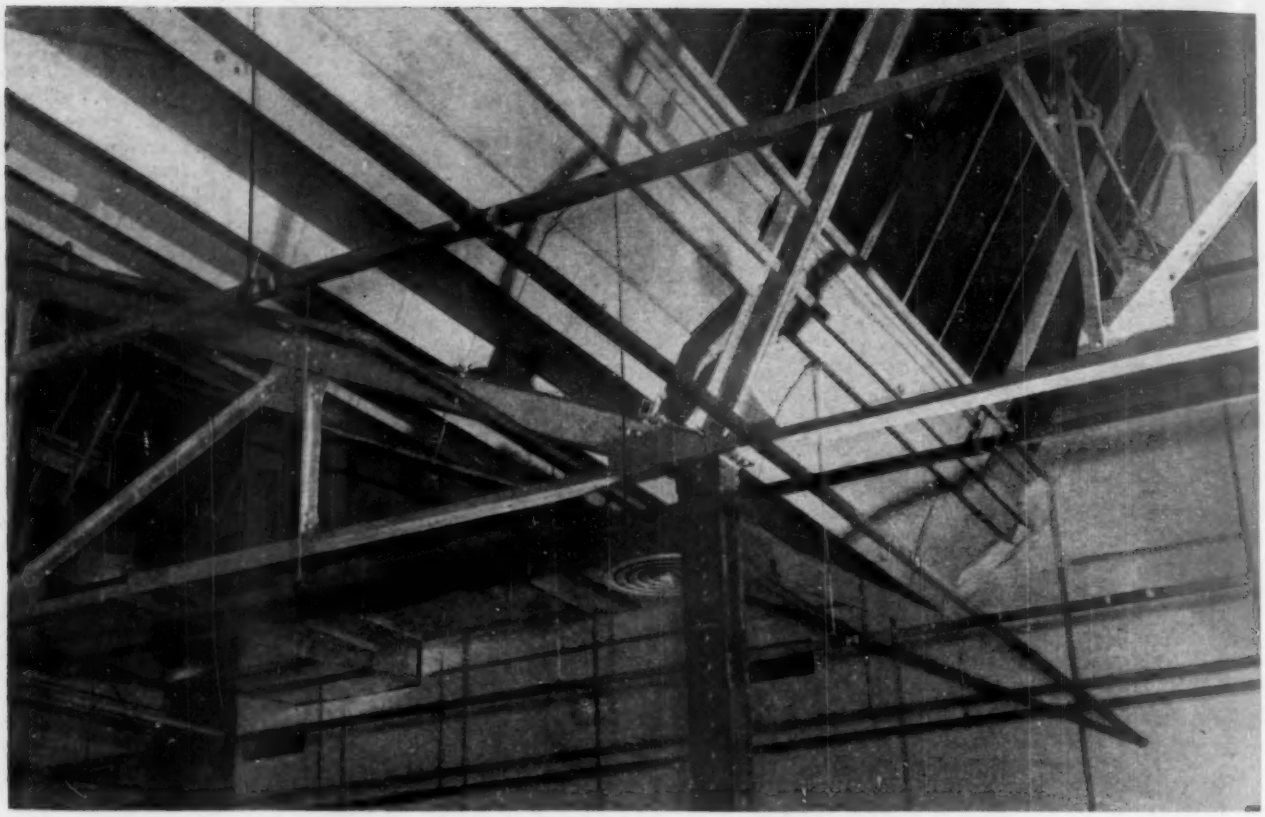


Fig. 1—The square channels in the upper part of this picture were gas welded together to provide raceways for the wires leading to the lighting fixtures. Notice the right-angle joints

Welded LIGHTING INSTALLATION

BY ALFRED A. WALD, *General Maintenance Welding Foreman, Caterpillar Tractor Co., East Peoria, Ill.*

THE maintenance welding department of the Caterpillar Tractor Company looks upon welding not as a substitute for some other method of joining but as a means for creating a structural design that could not be achieved so advantageously by any other method. This approach to the problem has frequently resulted in the creation of a new construction and redesigns of existing structures with appreciable savings in weight, lowered cost and/or higher functional efficiency.

Here is a typical case:

Fred C. Gedge, plant engineer, made the suggestion to eliminate the maze of chains, conduits, cords and supporting rods suspended from the saw-tooth roofs of one of our engineering drafting rooms. Instead we would use 1⅝-in. square channels and gas weld them together to provide raceways for the wires.

The selection of material for this installation was made on a basis of structural strength and weldability. We choose a structural framework (see Fig. 1) especially designed for all types of electrical construction. The channel section with its smooth interior and snap-on cover over the open slot provides a roomy raceway. Being furnished in 20-ft spans (weight 2 lb per foot), it is ideal for long-span requirements. By adapting feed-in boxes and receptacles to strut mountings the distribution scheme was complete.

The drafting department of the Caterpillar Tractor Company had rather a dim view until someone decided to install fluorescent lighting. Raceways for the conductors had to be gas welded in some tricky joints.

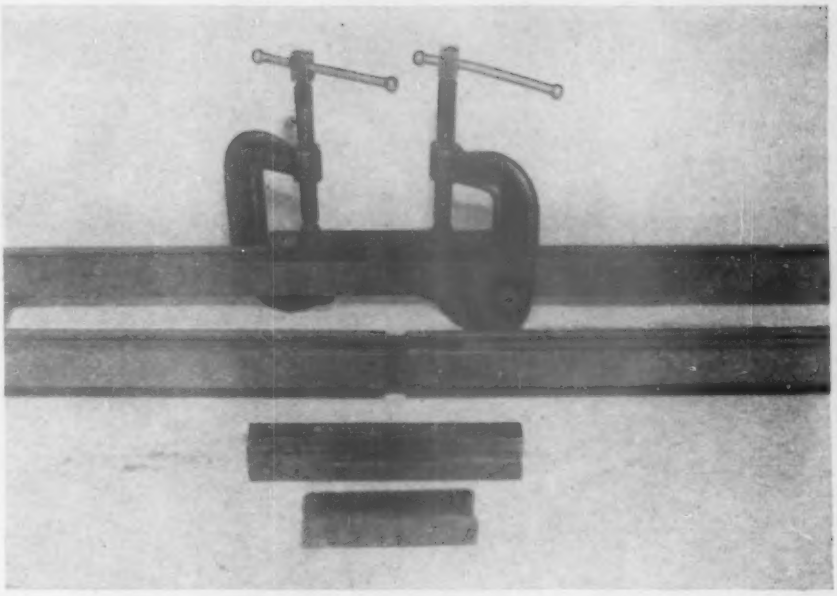


Fig. 2—When two lengths of channel had to be butt welded in a straight line, this simple set-up with two C-clamps sufficed to hold the alignment

The welded structure permits the suspension of heavy fluorescent fixtures with a minimum number of supporting rods (one per 20-ft bay). The use of strut channels as a raceway eliminates the need for parallel lines of conduits to serve the fixtures. The ease of installation and the flexibility of the lighting system were the deciding factors that led the Caterpillar-Tractor Company to adopt this practical raceway for lighting installations.

Though an installation of this

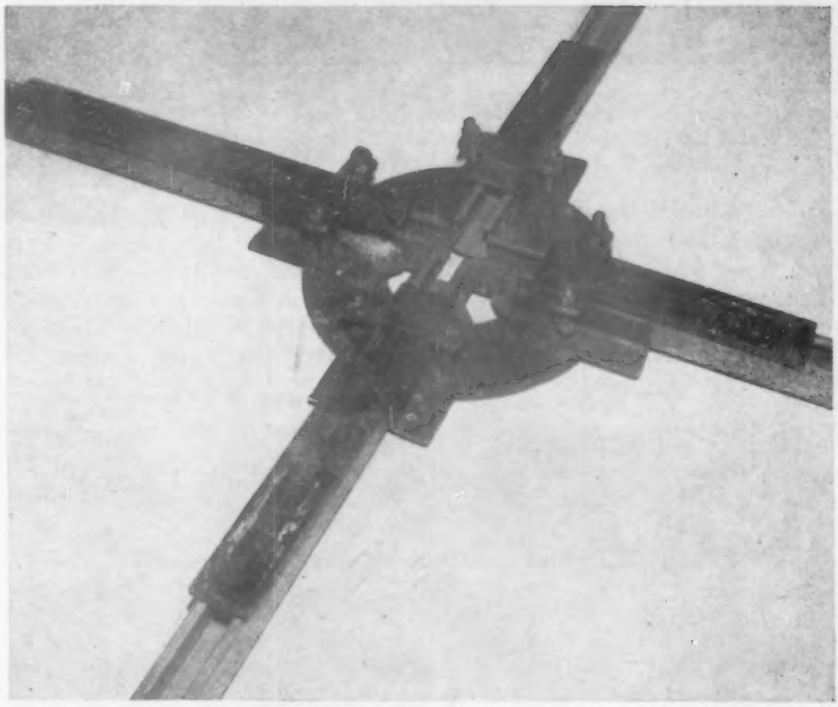


Fig. 3—For crossings at right angles, it was necessary to construct this fixture. Note how the channel sections are bolted into alignment

type is primarily an electrical problem, the welding department was called upon to play an important part. We were first consulted regarding the possibility of welding the 20-ft sections together and then regarding the welding of right angles and offsets with a smooth interior and no warpage.

Three Types of Fixtures

Before welding could be satisfactorily performed, it was necessary for us to design and make fixtures that would hold the strut in line after welding. Two C-clamps sufficed for the straight joints, and the simple arrangement shown in Fig. 2 worked out very well from the standpoints of efficiency and cost.

The welding of right angles was more difficult. Here we had to build the special fixture shown in

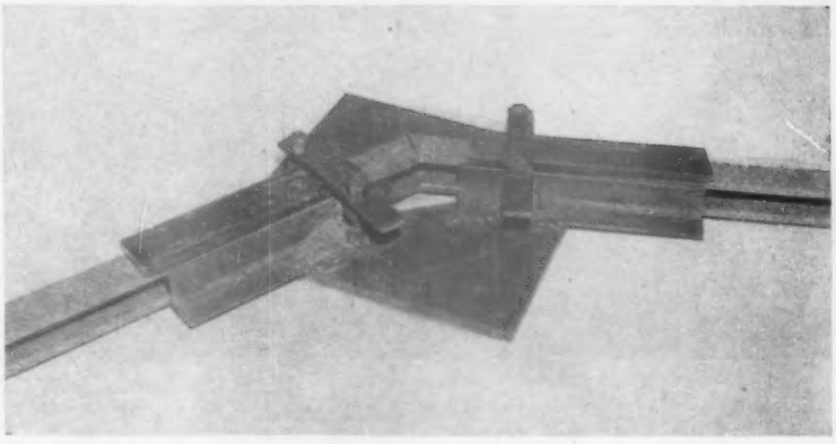


Fig. 4—This type of fixture, similar to the one in Fig. 3, was used for offset joints. Here the channels are to be joined at a 45-deg angle

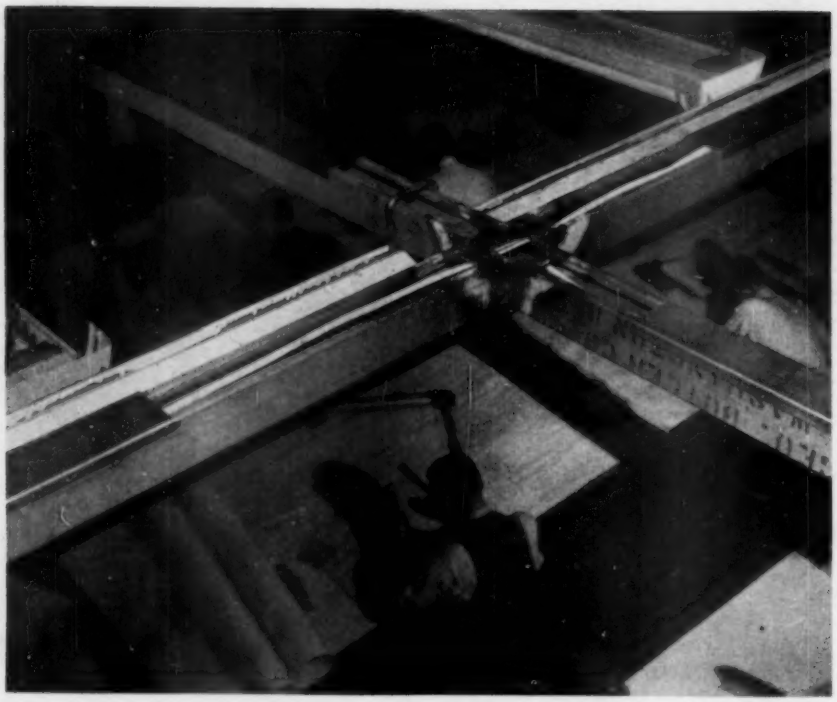


Fig. 5—A right-angle cross, looking down from above. The covers have been slid back to show the wires. The jig for welding is shown in Fig. 3

Fig. 3. Basically, this consisted of a circle 10-in. in diameter flame-cut from ½-in. mild-steel plate. The center of the circle was cut out so the weldor could have access to all the joints in any position for welding. Eight short angles were welded to the base plate to form a cross, and steel bolts were welded to these angles so that the channels could be bolted into position for welding. This type of fixture is easy to make; its cost is low, and it will last indefinitely. We have found it useful on other similar installations in the plant.

Fig. 4 shows the construction of the simple fixture we used for 45-deg offsets. This fixture was made on the same principle as Fig. 3. Both fixtures were designed and fabricated by the welding department at small cost, using only a cutting torch and an arc welder.

Examples of the smooth joints effected by oxy-acetylene welding may be seen in Figs. 5 and 6. Fig. 5 is a right-angle cross, with the covers slid back from the channels to show how the wires are contained in the intersecting raceways. Fig. 6 is a 45-deg double offset with the covers intact. Note how the channels and fluorescent fixture are supported.

Accessories used to make the circuit connections to the raceways and fluorescent fixtures included the sheet-metal snap-on covers, wall tubing and conventional utility outlet box, molded receptacles, right-angle attachment, plug caps, tubing connectors, fibre bushing, supporting rod, fixture hanger clamps and fixture chains. All of the hanger clamp attachments were fabricated in the plant maintenance department.

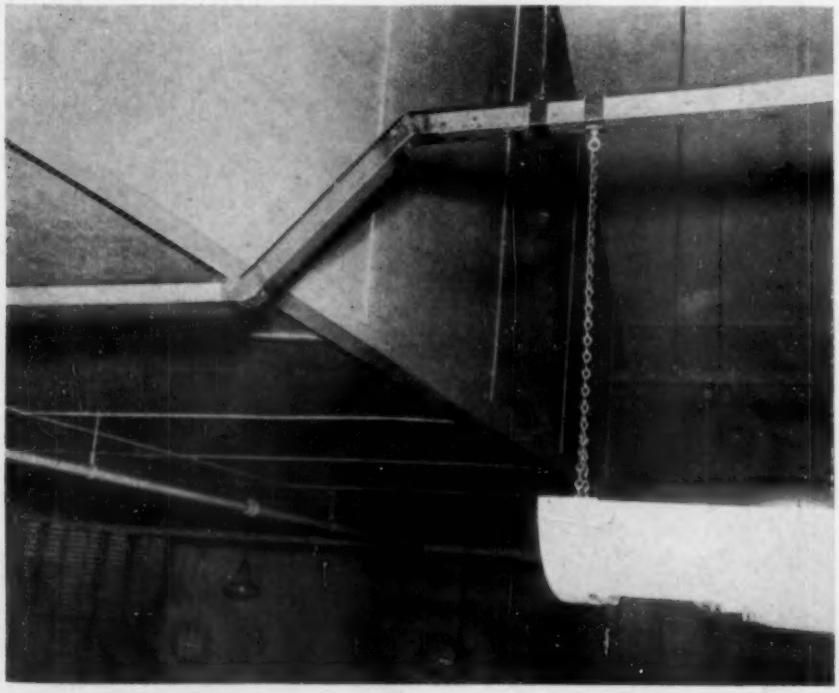


Fig. 6—The 45-deg offsets (see jig shown in Fig. 4) were needed to meet conditions like this. Oxy-acetylene welding gave smooth joints

Better Light for Drafting

Structural design of the building divides the drafting room into a number of 20 by 25 ft bays. The new lighting system provides each bay with eight 200-watt fluorescent units, each equipped with 40-watt white tubes. Fixtures on 10 ft by 6 ft 4 in. centers are chain-suspended from the raceway channels 10 ft above the floor and connected to the circuit by flexible cords. To service a unit, the electrician merely pulls out the cord plug, unhooks the fixture and replaces it with a new one while the damaged one is being repaired. Groups of fixtures are controlled from column-mounted switches.

Lighting intensity provided by the new system averages 55 foot-candles (readings taken at night). Previous lighting with 300-watt incandescent lamps had provided a maximum of 20 foot-candles.

★ OPERATION

Metal Cutting with the Metal Arc

Fig. 1—Holder required for arc-oxygen cutting. Operator is about to pierce a 2-in. thickness of mild steel

BY T. B. JEFFERSON

DURING the war considerable progress was made in the application of the metal arc to the cutting of metals. This wartime process was developed essentially for cutting materials underwater, though used to some extent for applications above. Research along this line did not stop when the war ended, and before long the metal-working industry was apprised of a product and process which afforded a successful means for metal-arc cutting of stainless steel, cast iron and non-ferrous alloys, as well as ordinary mild steel.

ARC-OXYGEN METHOD

In this new process, known as the Arcos "Oxyarc" process, the cutting is accomplished by directing a stream of oxygen into a pool of molten metal. The pool is made and kept molten by an arc established between the base metal and the coated tubular cutting rod, which is consumed during the cutting operation. In addition to providing the arc, the tubular rod also provides an oxidizing flux and a means of conveying oxygen to the surface being cut.

The tubular cutting rod is made of mild steel. This is not a detriment when the rod is used for cutting materials other than mild steel because no contamination of the

Table I. Current Settings (a-c or d-c) and Oxygen Pressures

Chrome-Nickel, Straight Chrome, Monel, Nickel			Brass, Bronze, Copper			Cast Iron		
Thickness	Amp	Oxygen, Psi	Thickness	Amp	Oxygen, Psi	Thickness	Amp	Oxygen, Psi
¼	175	3–5	¼	180	10–15	¼	180	10
½	185	5–10	½	185	10–15	½	185	10–15
¾	195	10–15	¾	190	15–20	¾	190	15–20
1	200	15–20	1	200	20–25	1	200	20–25
1¼	210	20–25	1¼	210	25–30	1¼	210	25–30
1½	215	25–30	1½	215	30–35	1½	215	30–35
1¾	220	35–40	1¾	220	35–40	1¾	220	35–40
2	220	40–45	2	225	40–45	2	225	40–45
2¼	225	45–50	2¼	225	45–50	2¼	225	45–50
2½	225	50–55	2½	230	50–55	2½	230	50–55
2¾	230	55–60	2¾	230	55	2¾	230	55–60
3	230	60	3	235	55	3	235	60
Aluminum			**Low Alloy** (Alloy Content Less than 12 %)			**Carbon Steel** (And Low-Alloy, High-Tensile)		
Thickness	Amp	Oxygen, Psi	Thickness	Amp	Oxygen, Psi	Thickness	Amp	Oxygen, Psi
¼	200	30	¼	175	30–35	¼	175	75
½	200	30	½	180	35–40	½	175	75
¾	200	30	¾	190	40–45	¾	175	75
1	200	30	1	200	45–50	1	175	75
1¼	200	35	1¼	205	50–55	1¼	200	75
1½	200	35	1½	210	55–60	1½	200	75
1¾	200	40	1¾	215	60–65	1¾	200	75
2	200	40	2	220	65–70	2	200	75
2¼	175	45	2¼	225	70–75	2¼	225	75
2½	175	45	2½	225	75	2½	225	75
2¾	175	45	2¾	230	75	2¾	225	75
3	175	45	3	230	75	3	225	75

Table II. Approximate Cutting Speeds for Various Alloys

Metal or Alloy	Thickness, Inches	Speed, In. per Min
Aluminum	3/8	15.0
Bronze	1	3.3
Cast Iron	2	2.0
Copper	1/4	23.0
Hastelloy B	3/8	9.0
Nickel	1/2	5.5
Monel	1	2.7
Type 347, Stainless	1/4	10.0
20% Stainless-Clad (cut from steel side)	5/8	13.5
Mild Steel	1/4	40
	1/2	35
	3/4	30
	1	22

base metal adjacent to the cut occurs. The possibility of contamination is eliminated by the combination of extremely high heat and oxygen under pressure, which act together to oxidize the rod and coating at the point of the arc before the rod metal can fuse with the base metal. The rod coating helps to maintain arc stability by confining and directing the arc. When in use, it acts as an insulator to prevent the arcing of the rod at undesirable areas.

Quite simple equipment is required for metal cutting by this arc-oxygen process. There is, first of all, a special electrode holder (Fig. 1), which is not unlike an arc-welding electrode holder in appearance. This holder serves the double function of conducting current and feeding oxygen for the cutting operation. The tubular cutting rod may be inserted or removed from the holder with the same ease that an electrode is handled in an ordinary holder. As the picture shows, this valve is triggered by the operator with the same hand which grips the holder.

The only other equipment required for arc-oxygen cutting is that usually found in any shop where metal fabricating is done; *i.e.*, an arc welder, either a-c or d-c, and an oxygen source (cylinder or manifold) with the usual regulating valves and gauges.

What May Be Cut

The arc-oxygen process has been used successfully to cut high-chrome and chrome-nickel stainless steels, nickel, cupro-nickel, Monel, nickel-clad or stainless-clad steel, bronze, copper, brass, aluminum, cast iron and mild and low-alloy steels. It has been found to work equally well with sheets, plates or castings of these various materials. While the arc-oxygen process has proved superior to most other cutting methods for the severing of stainless steel and nonferrous materials, it will not supplant the oxy-acetylene flame on general cutting applications. From a cost standpoint, it is generally less expensive to use the oxy-acetylene flame to sever mild steel and other readily oxidized materials.

Table I gives the recommended amperage settings and oxygen pressures to use in the cutting of eleven materials with a standard 3/16-in. rod. Metal thicknesses up to 12 inches have been pierced with an 18-in. cutting rod of the standard 3/16-in. diameter.

This versatile cutting rod not only cuts all kinds of metal but may also be used to cut metals in any shape and under various conditions. It is, to borrow a phrase from weldors' terminology, an "all-position" rod that will cut in the overhead and vertical as well as downhand positions. It is said to be able to pierce a plate with greater ease and in less time than a high-speed drill, and it will pierce or cut stacked materials even when they are not clamped.

No particular training is required to attain proficiency in arc-oxygen cutting. Only a few minutes' practice is needed for a weldor or flame-cutting operator to acquire the "feel" of this technique. It is also claimed that it is almost as easy for an individual without previous welding experience to learn to arc-cut by this method. Of course, as in any skill known to man, practice will improve the operator's technique. Since the basic handling of the method is easily acquired, the improvement is usually quick and rapid.

No Preheating Required

Cutting may begin immediately after the arc has been established. The elimination of preheating is

Fig. 2—Cuts in 20% stainless-clad steel made at the plant of E. C. Wolferz, Belleville, N. J. Openings are of 18-in. diameter, and the material is 5/8 in. thick

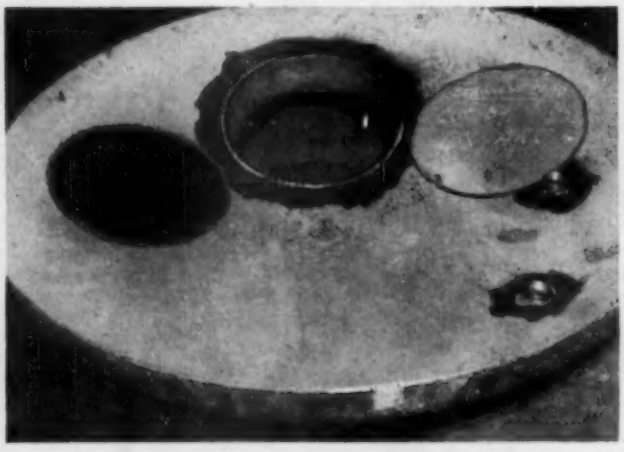
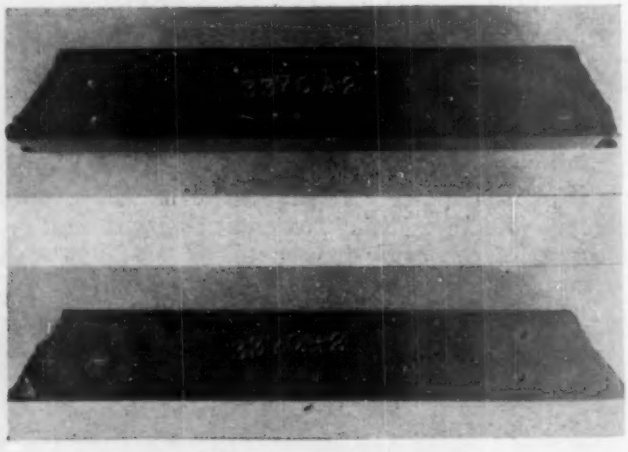


Fig. 3—Appearance of heat-affected zone, arc-oxygen-cut specimens of 304 stainless, after boiling plate for five 48-hr. periods in 65% nitric acid solution (Huey test)



especially advantageous when making cuts of short lengths.

Table II shows some of the cutting speeds actually obtained on various thicknesses and different kinds of metals and alloys. It is an easy matter to time any particular cutting operation and to compute the cutting time saved on hard-to-cut metals. Not quite so easily figured, but no less important, is the general speeding up of the flow of work through the shop because of the decrease in the time required for a cutting operation.

As computed with other hand-operated cutting processes, arc-oxygen cutting shows many cases of reduction in the subsequent grinding or machining required on the cut edges. This is because arc-oxygen cutting allows the cut to be made very close to the finish line (see Fig. 2). Grinding, when it is necessary to produce a perfectly smooth edge for a proper fit, is held to a minimum.

All of the preliminary tests conducted on cuts made by this method indicate that the base metal is not contaminated. This fact is especially important in the case of stainless steel. Test data indicate that the heat-affected zone of the base metal (Fig. 3) is substantially less than that encountered in arc welding. Warpage, even in thin sections, is negligible because the heat is applied only momentarily to an area of about the cross-section of the cutting rod. Grinding, drilling, chipping or other machine operations on materials cut by arc-oxygen are usually less difficult than they would be if the materials had been cut by other methods.

Much time, particularly layout time, can be saved in the fabrication of complicated shapes. Holes for flanges, manholes or other types of connections can be cut in the main vessel after forming. The portability of the equipment, the piercing and cutting qualities of the process make it possible to effect substantial savings.

Potential Applications

Fabricators are finding that some of the time-consuming problems which arise in attempting to form pieces with holes have been eliminated. Most of the fabricator's layout problems are now miminized

The foundry will welcome the ease with which this arc-cutting process removes risers from castings, regardless of material or shape. The steel mill should likewise find the process effective in the gouging of alloy ingots.

In the scrapyard, where the cutting of a multitude of different alloys is the main activity, the arc-oxygen process will quickly establish itself as a means for all-purpose operations. It will likewise find uses in the cutting and piercing necessary for the removal of rivets.

Some specific uses are shown in the accompanying pictures. In Fig. 4 a rectangular opening in ⅜-in. Monel plate has been cut in a formed tank head at the plant of E. C. Wolferz, Belleville, N. J. Fig. 5 shows a maintenance worker cutting off a cast-iron bearing support at the power plant of the Bush Terminal Co., Brooklyn. Fig. 6, also at the Wolferz plant, shows a free-hand cut, made by following punch marks, in 3/16-in. Monel plate.

The above are but a few of the potential uses for this new metal-cutting processes. Undoubtedly, its application will be expanded greatly as it is extended to other industries.

Fig. 5—This maintenance worker at the Bush Terminal power plant, Brooklyn, uses the metal arc to cut off a cast-iron bearing support

Fig. 4—This rectangular opening in a formed tank head was cut freehand in ⅜-in. Monel plate in 20 minutes. The operation required 54 in. of oxygen-arc cutting

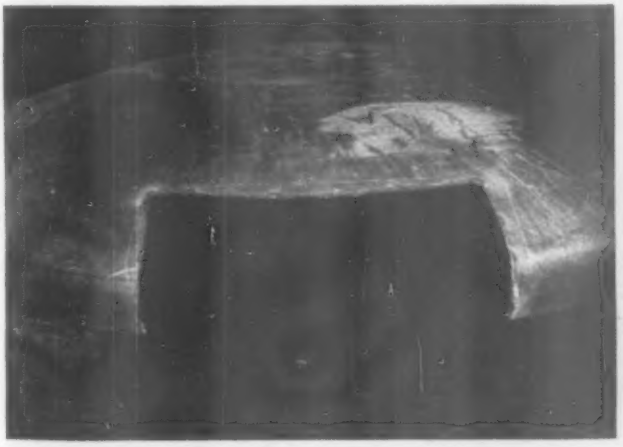


Fig. 6—Cutting a 27-in.-diameter hole in 3/16-in. Monel plate in the shop of E. C. Wolferz, Belleville, N. J. It took 14 minutes for this cut, made by following punch marks

Successful Selling

BY CLYDE B. CLASON

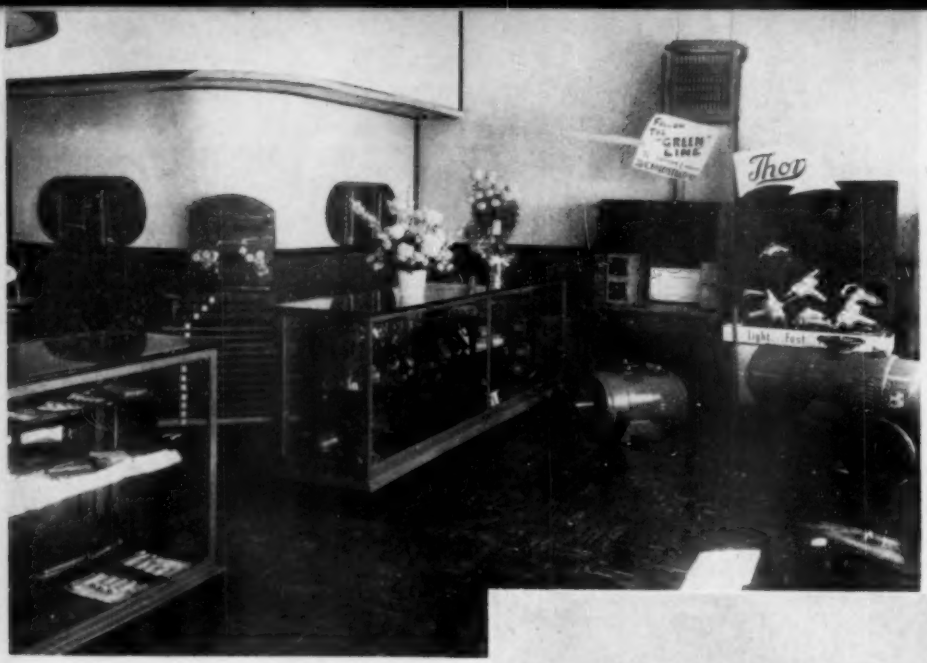


Fig. 2 (above)—Right side of the showroom. This photo was taken on opening day, when Unger staged an open house attended by 550 visitors

Fig. 1—Howard Unger floodlights his show windows all night long, let's motorists passing on the state highway know he is in the welding business

EFFECTIVE display of merchandise is half the battle, according to Howard Unger, proprietor of Kankakee Welding & Supply, Kankakee, Ill. "People don't like to do business in a hole-in-the wall," he says.

Unger's own store is highly attractive, both inside and out. He is so proud of its appearance that he floodlights his two show windows all night long—which is more than many a big city emporium will do. But this twenty-four-hour a day display of welding equipment has brought him many sales.

A Job Shop and Distributor

"Red" Unger—he's known by that nickname to about half the 30,000 population of this prosperous little midwestern city—came to Kankakee some 16 years ago and started work as a mechanic in a factory. He was then only 16 years old. Within ten years he had established his own welding job shop and was earning a good living doing general repair and maintenance work. About 14 years ago he took on the distribution of welding gases, largely, he frankly explains, because it enabled him to get a better price on the oxygen and acetylene he used in his own shop. The job shop has grown to the point where it employs five men: nevertheless, it now plays second fiddle to the distributing part of the business.

Other lines were gradually added over a period of years. A full-fledged retail business was launched just a little over three years ago, handling a complete line of oxy-acetylene welding and cutting equipment; a-c and d-c welders, welding and brazing fluxes, weld-cleaning brushes and hammers, rotary brushes, tip cleaners, grinders and grinding wheels, electric hand tools and other similar merchandise.

Last November he opened a new store at 653 West Station Street. This location is about ten blocks from the heart of town, fronting on the Kankakee river beside the bridge over which an east-and-west state highway crosses. The previous location in the main business area was no good to him, Unger says, because of the difficulties customers had in parking. Now there is plenty of parking space as well as a steady stream of motorists going past the well traveled state highway.

Unger bought the building, which was formerly a grain and food store, and spent more than the purchase price in fixing it up according to his own very good ideas of what a welding supply distributorship should look like. Fig. 1 shows the store front from the outside. Floodlighting the show window, says Unger, keeps burglars away, draws in customers. One man stopped and bought a welder, explaining that he had driven by the store several times at night, had been struck by its well illuminated front and had determined to buy something there.

Another man dropped in, bought a welder and loaded it in his car to

Welding Distributor Operations - 4

in the Farm Belt

Service plus an attractive store are the two necessities for operating a successful welding supply business in a farm-belt town of 30,000 says "Red" Unger of Kankakee, Ill.

Fig. 3—Center view of the showroom. Every item that Unger sells is plainly visible, either under glass or in the open

Fig. 4 (right)—The service department repairs torches and regulators, is highly important as a selling aid

drive all the way back to Arizona. He liked the appearance of the store, this customer explained, and that was what decided him to buy so far from the home base.

Figs. 2 and 3 show the store from inside. The showroom extends across the entire 40-foot front and runs back for about 20 feet before the shop and offices begin. The dividing line is formed by three large glass showcases and two floor display stands (the latter aren't shown in the pictures). Welders are placed in front, upon a composition flooring that is dark, smoothly finished and easy to keep clean. Several counter displays are scattered at strategic intervals across the three showcases.

Every article that Unger stocks is plainly visible—either in the open or under glass—so that customers can sell themselves while they are awaiting their turns to be served. Unger does a large walk-in business, and he attributes a lot of this to the appearance of the store. He got off to a good start by holding an open house when he first moved in. Sandwiches and beer were served in the basement, and demonstrations of welding and flame-cutting were staged. About 550 people attended this event.

Companion Merchandise

"It's easier to sell more to a customer than to sell more customers," says Unger. For this reason, he stresses what he calls "companion merchandise." This category includes items which, while not specifically related to welding, are of use to welding users. Some examples are drill bits, drills, a power hacksaw, hacksaw blades, metal stools for weldors to sit upon, portable electric tools. These products don't take much room in the store nor tie up too large an investment, and they mean many sales that would not be made otherwise.

Unger is always keeping his eyes open for whatever he thinks will interest customers. Recently he bought ten sidewise moving jacks that were originally used by the Army to lever tank treads in place. These proved very popular—he only had two of them left at the time of the writer's visit. Another good item is a bolt cutter, a pair of shears with handles three feet long.

Unger takes advantage of the excellent delivery service that manufacturers are rendering today. His only large stocks are of electrodes, which he buys in quantities sufficient to secure the best discounts. A perpetual inventory system, posted daily, lets him know

at a glance just how much of any item there is in stock. A red tab on an item means that it's time to reorder, and a green tab means that the order has been placed. All tabs are removed when the new stock comes in.

Besides himself, Unger has two truck drivers and two inside men working at the distributing end of the business—and two girls for office work. He also has eight subdealers, serving Danville, Champaign, Rantoul and intermediate points. More subdealers could be obtained, but he would not be able to service them because of the present shortage of oxygen and acetylene cylinders.

Service Department Active

The service department (Fig. 4) repairs and reconditions torches, pressure regulators and other oxy-acetylene equipment. This particular part of the business—which averages perhaps 5 to 10% of the total gross volume—is extremely important as a selling point. Service, Unger emphasizes, is the one sure way in which the dealer or distributor in the smaller city can meet big city competition.

The man who buys an oxy-acetylene outfit from Kankakee Welding & Supply can be assured that he will be able to keep it in perfect working order without long delays or trips to the city for spare parts. If the customer needs the immediate use of the equipment, Unger will loan him a service torch or regulator while his own is undergoing repair. The service department replaces valves and seats in regulators, lacquers and polishes them to look like new. The same type of treatment is given to torches. Tips are also reconditioned, the clogged orifices being drilled out to correct dimensions. All of this builds up an immense amount of good-will.

Unger's two trucks cover a territory of a 100-mile radius from Kankakee, serving some 100 towns ranging in population from practically nothing up to 40,000 (Danville). The large truck is mostly used for the delivery of oxygen and acetylene cylinders. Two truckloads a week are hauled from Chicago.

Fig. 5—This neat truck carries welding supplies and apparatus out in the territory for on-the-spot sales. About 100 towns are regularly visited

The smaller truck (Fig. 5) has a closed body in which compartments have been built to hold electrodes, welding rods, safety equipment, grinding wheels, etc. Especially noteworthy is the iron grille (Fig. 6) that was designed and fabricated by the ornamental iron workers in the job shop to separate electrodes according to sizes and classifications. Each of the several compartments in the back of the truck is kept locked with a separate key, a precaution that insures against pilfering. Welders and similar equipment can be carried in the relatively large open space in the center of the truck. Large signs and contrasting colors make this vehicle a mobile advertising medium.

The truck salesman carries with him a set of books on which is listed every user of welding supplies and gases in every town. In addition to calling upon the regular customers, he follows up leads and occasionally makes cold-turkey calls on likely prospects. The smaller merchandise is delivered from the truck at the time of sale. The truck salesmen makes a series of two-day trips, each day covering 75 to 80 miles and making about 25 calls. About once a month Unger himself goes on the road to make personal calls on customers.

The Farm Market

About 20 to 25% of Unger's total sales are made in rural areas, 40% are among job shops and garages, 10% are industrial and another 25% include miscellaneous oxygen users such as hospitals, etc. It can be seen from this breakdown that the farm market is of great importance.

Farmers buy both a-c welders and oxy-acetylene welding outfits, with the latter slightly favored by many because it enables them to do both welding and cutting. Once a farmer has bought a welder, he becomes a continuous customer for welding supplies. Some farmers, it is true, buy the equipment and never learn to use it properly, but these are in a decided minority since most farmers are naturally good mechanics.

"The farm picture is changing rapidly," asserts Unger, "because of the many young farmers who learned to weld while they were in the Army. These bright young fellows—now back on their own farms or on their dads'—are using their knowledge of welding to keep

Fig. 6—The truck in Fig. 5 is divided into neat compartments to hold welding supplies. Note the iron grille that separates the different electrodes

equipment repaired. Particularly, they like to work upon such jobs after harvest and during the winter months when there isn't a great deal going on around a farm. This condition is generally true throughout our territory, and it has opened up a whole new market for us."

Questioned about hard-facing, Unger replied that it was not used nearly as much as it should be by the farmers around Kankakee. This is because they haven't yet been thoroughly convinced of its advantages. The condition will change gradually as farmers learn of the much longer service they can secure from hard-faced tractor treads, plowshares, harrow runners, harrow teeth and other parts subjected to heavy abrasive wear. Educational work on a broad scale is called for, Unger thinks. He plans to secure the coöperation of a leading manufacturer of alloys in staging a hard-facing clinic to demonstrate the advantages of the process. An offer to hard-face a pair of shears free for each farmer who brings them in should be all that is necessary to start the ball rolling. Such a clinic, Unger believes, would repay both him and the manufacturer many times what it would cost.

Leads for New Business

Unger maintains that no man can succeed in business in a town unless he is willing to make himself an integral part of the town life. He supports a good many civic and social activities and has a first-name acquaintance with at least every other man he meets on the street. Many leads for welder sales to farmers come from tips given to him by various friends. All that is necessary is to keep his ears open as he circulates among his acquaintances.

Unger is a consistent advertiser. A classified business-card ad is carried regularly in four weeklies and three nights a week in a daily. The copy is the same for each paper and never changed, but the ad is shifted from time to time among classifications such as Farm Supplies, Merchandise for Sale, Help Wanted, Business Opportunities, etc. Every three months this program is augmented by a 6 by 9 in. display ad—the last one was on a-c farm welders and the next one will be on oxy-acetylene welding and cutting equipment. It is hard to evaluate this advertising as returns may trickle in for several months after the ad has appeared. He compares his advertising to a seed that is planted in a man's mind; he reaps the harvest when the man finally does get ready to buy.

Newspaper advertising is supplemented by direct mail, sent out monthly to a list of 250 prospects. He uses a manufacturer's prepared direct-mail program—it is amazing, he says, what a lot of good help a distributor can receive from a manufacturer and how little it costs him. Besides this regular scheduled program, envelope stuffers and other pieces of literature are used as the occasion arises.

Popular Blotter Girls

Unger's own advertising pieces include a series of monthly calendar blotters, each of which is featured by an eye-catching technicolor portrait of a pulchritudinous blonde or brunette. These are very popular. Unger also uses pretty-girl calendars—this year he distributed 200 of them to restaurants, taverns and other public places where they will be put on a wall. Remaining in place for a year, the calendar has all the advantages of an advertising poster without rental for the wall space. Fifty de luxe calendars which show a fisherman and a beautiful mountain lake were not nearly so much in demand as the pin-up girl.

Many good ideas are to be found in trade papers, says Unger, who reads them all regularly. Particularly valuable to him is the annual Welding Directory section of The Welding Engineer.* This he keeps on file and refers to constantly. "For instance," he explained, "I am now considering adding a line of spot welders and have written to several of the manufacturers listed under this heading."

New product items he also finds very valuable.

In this territory, welding did not fall off any when the war ended. On the contrary, Unger has been experiencing a steady increase in business ever since V-J day. He had just finished the biggest month of his whole career at the time this article was written.

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* Last edition, April, 1947.

Courtesy American Optical Co.

Glycerine preparations are efficient in the prevention of fogging or misting of goggles and welding lenses. This composition is applied to both sides of the lens

Glycerine and Welding

Glycerine and its chemical compounds are finding many applications in products used to improve the efficiency and safety of welding. Some examples are: spatter preventives, ultraviolet protective paint, fire-resistant fabrics, welding curtains, anti-fogging compounds and bonding agents for abrasives.

BY GEORGIA LEFFINGWELL, PH.D.
and
MILTON A. LESSER, B. Sc.

THOSE aware of glycerine's extraordinary adaptability know that it is utilized by almost every modern industry. Welding is no exception. Many products of interest to welding operators benefit from glycerine and the synthetic alkyd resins made with glycerine.

Chemical and Physical Properties

This fluid is outstanding among raw materials because of its combination of physical properties. Many industrial materials include glycerine because of its ability to attract and retain essential moisture. This hygroscopic or humectant action accounts for its extensive use where excessive drying, with subsequent crumbling and cracking are to be avoided and where flexibility and pliability must be retained.

A clear, heavy, syrupy liquid, glycerine is an excellent lubricant that is applicable where other antifriction materials cannot be employed. It is an outstanding solvent for many substances, and a good suspending agent for others. Unlike many other industrial materials, glycerine is entirely safe to handle and use. It offers no fire or toxic hazards. It is a highly stable substance; the wide range between its freezing and boiling points assures continued efficacy under conditions that would render other materials useless.

Glycerine, however, is also an important chemical substance capable of entering into many important reactions. Perhaps none of these reactions is more important than those resulting in the formation of synthetic alkyd resins. These resins are often referred to as glyceryl phthalate resins because glycerine and phthalic acid (usually in the form of its anhydride) are the most important raw materials in the synthesis of superior types of alkyd resins. Of course other organic acids may be made to react with glycerine to form special alkyds. The characteristics of these resins are also controlled by various modifying agents.

Glycerine-utilizing alkyd resins have become the most important synthetic resins used in the production of protective and decorative paints and varnishes as well as other protective and decorative finishes.[1,2] Providing coatings of notable toughness and durability, the alkyds have found numerous other important applications in metals and the metal industries.

Spatter Preventives

Illustrative of the adaptability of the alkyd resins is their employment in coatings which prevent the adhesion of weld spatter.* One of the country's leading manufacturers of electric equipment, also a leader in the development and production of glyceryl phthalate

* Editor's Note: Manufacturers of spatter preventives are opposed to the use of glycerine itself for this purpose. The opinion of one manufacturer is quoted below:
"Glycerine alone, or any type of oil or soap, will in itself prevent spatter adhesion. However, glycerine, oils, etc., are objectionable because they cause smoke, fumes and odors under the heat of the welding arc. Because they do not dry, they are messy to handle when applied and in some cases provide a safety hazard. In most cases they require special degreasing with a solvent cleaner before the weldment can be painted."

AN EXAMPLE:

This is a diesel engine exhaust manifold outlet fabricated with Tube-Turn welding fittings taken out of regular stock. Replacing castings—eight such outlets to an engine save 71 lbs. per horsepower. Seems little, but multiply this by 1000 and you have 710 pounds of dead weight eliminated.

"It can be done!"

SO MANY piping problems are solved with the use of welding fittings that it pays to see your Tube-Turn Distributor first. He handles *the fitting that becomes part of the pipe.*

Tube-Turn welding fittings—engineered in design, built with closer tolerances than code requirements, available in a wide variety of styles, sizes and materials—often offer just the right answer to what sometimes seems an impossible problem. Welding fittings for example, permit extremely close nesting without flow loss. Tube-Turn welding fittings have uniform wall thickness and full circularity which allows them being cut and used at odd angles. Order one, one-hundred, or a thousand Tube-Turn welding fittings of the same size and part number and they will be dimensionally uniform. They can be and are being used in production line assembly of equipment.

For full information about the more than 4000 types and sizes in the complete line of Tube-Turn welding fittings and flanges—for details about the wide range of special metals and alloys—for the name of your nearest distributor, write to—

TUBE TURNS, INC., LOUISVILLE 1, KENTUCKY
District Offices at New York, Washington, D. C., Philadelphia, Pittsburgh, Detroit, Chicago, Houston, San Francisco, Los Angeles.

TUBE-TURN TRADE MARK **tt** *Welding Fittings and Flanges*

resins, provides a series of such materials made with alkyd ("Glyptal") resins. Operators know that the use of such welding aids saves practically all the time once required for cleaning weld spatter from surfaces which are to be finished.

With such an alkyd-containing coating, spatter rolls off the surface or can be brushed away like loose dirt, instead of sticking or partially welding to the metal.

One such coating composition, provided as a clear product, is applied by brushing or spraying. When properly used, it causes no harmful results either to the weld or weldor. It produces no injurious fumes, offensive odor or smoke to fog the weldor's glass. It forms no oxides to make the weld brittle, injure its ductility or cause porosity. Another advantage of using this type of coating material is that a single coating prevents adhesion of multipass welds. Unless removed afterwards by buffing, sandblasting or shotblasting, the coating serves as an excellent base or primer for subsequent painting.

Another variation not only prevents the adhesion of weld spatter but also provides protection against corrosion on surfaces such as the overlapping edges of a lap joint, which may not be accessible after welding. A third type of coating provides the characteristics necessary for use in the resistance-welding process.

A patent[3] assigned to this company illustrates how alkyd resins are used in the formulation of these spatter-resistant materials. In one example, linseed oil acids, tung oil, rosin and a phenolic resin are used in conjunction with the reaction product of glycerine and phthalic anhydride. The coating compounds are recommended for use in welding materials such as steel.

Use in Fabrics

Another welding aid in which "Glyptal" is used is an ultra-violet ray protective paint. When applied on the walls and surfaces in and around welding booths, such a coating absorbs most of the harmful ultra-violet rays emanating from the welding arc.

Other materials designed to heighten the safety of operators utilize glycerine and its resinous derivatives. For example, alkyd resins have been recommended to improve the wearing qualities of asbestos fabrics, employed in safety garments and also in weldors' curtains. One patented method[4] improves the wearing qualities of woven asbestos garments and decreases their tendency to dusting and fluffing by impregnating or coating the fabrics with a flexible, wear-resistant, heat-resistant glycerine-phthalic acid-type synthetic resin. The alkyd is thinned with an appropriate solvent and applied to the fabric.

Glycerine is also suggested as a suitable lubricant for use in making knitted asbestos fabrics.[5] Glycerine has long been employed in preparations used in fire-retardant treatments of fabrics.[6] Among its other functions in such compositions, glycerine serves to combat the stiffness caused by treating the fabrics with chemicals designed to raise their fire resistance. An interesting example of such utility is its employment in the production of substitutes for asbestos cloths. Resulting in fabrics suitable for heavy-duty welding curtains, the process has been thus described in detail in a foreign publication.[7]

The fabric is fireproofed by saturating it with a solution of ammonium phosphate. After it has dried, it is coated with three layers of a mixture containing casein, water, glycerine and ammonia. Thin or transparent fabrics can be rendered opaque by adding zinc oxide or soot to the mixture. Protective curtains made by this method were found to be somewhat more resistant than curtains of fireproof tenting canvas subjected to suitable impregnation.

In a report on the characteristics of fire-retardant treatments for fabrics, published by the National Safety Council,[8] this procedure was described as providing good flame-resistance, good afterglow depressing properties and only slight corrosive effects on metal parts. It causes no change in the durability of the fabric, but does stiffen it and somewhat reduce its strength.

"Now, Madam, let's see if I have this straight —you want us to come over and weld the lil' jigger that's on the whatchamacallit—the one that's on the doohickey, 'you say."

Anti-Fogging Compounds

In any consideration of materials to improve the efficiency and safety of welding operators, the value of glycerine in compositions to prevent fogging or clouding of goggles or the lenses of welding helmets is important. Long used and highly efficient for this purpose, glycerine pencils have been recommended[9] by those concerned with visual efficiency in industry. Anti-fog compound is also packaged in jars.

Many modifications of glycerine-utilizing glass-polishing and anti-mist preparations are available; one recent patent[10] describes the manufacture of specially treated papers for such purposes.

Abrasive products are important in the preparation of surfaces for welding as well as for smoothing the metal after the weld has been made. Glycerine finds extensive use in the manufacture of abrasive papers and cloths and in the production of vitreous-bonded abrasive wheels. Employed chiefly as a plasticizing agent, to maintain flexibility and impart longer efficient life to sheet abrasives, glycerine may be added to the bonding agent for the abrasive particles or used to treat the support for the grinding agents.[11,12,13] In making molded products, it is utilized to facilitate shaping and to prevent crumbling through drying.[14] The glycerine volatilizes off during the high firing temperatures without leaving any undesirable residue. Of interest in this connection is the use of glycerine-litharge cement as the bonding medium for abrasives

to make finish-grinding and polishing stones.[15] Glycerine-litharge cement is a mixture of glycerine and lead oxide which sets to a hard mass of great strength in a time dependent upon the quality and age of the litharge (fused lead monoxide.)

Alkyd resins have many uses also in making abrasive sheets and wheels.[16,17,18,19] The incorporation of glycerine in these resins enhances the durability and heat-resistance of the resulting products.[20]

Experienced gas welding operators know that no oil or grease should be used around oxygen tanks, regulators or the like because oil may ignite and burn violently in the presence of oxygen under pressure. Under such conditions, glycerine's lubricating properties are often very valuable.† For example, suspensions of colloidal graphite in glycerine are employed for lubricating oxygen compressors.[21] Some years ago studies were made on explosion-proof lubricants,[22] testing graphite alone and graphite mixed with glycerine and other lubricants. Glycerine was found to be the safest lubricant of those investigated.

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† Editor's Note: The 1947 edition of the IAA "Safe Practices for Oxy-acetylene Welding and Cutting" does not endorse the use of glycerine in the lubrication of pressure regulators. In general, the prevailing belief is that no lubrication at all should be used on any part of these devices.

Machine Tool Show

"More Goods for More People at Lower Cost" is the theme of the 1947 Machine Tool Show to be held in Chicago, September 17–26. Some 1,000 machine tools and related equipment will be displayed in the Dodge-Chicago plant.

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Here is good news for welders who look for only the best in welding equipment and supplies. TITAN Bronze Welding Rods, recognized the world over for their high quality and uniformity, are now available in whatever quantity you require . . . and can be shipped promptly.

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Transformers for

How to select the proper sizes of welding transformers for a submerged-melt welding installation is told here by a well-known expert on the subject. Mr. Wyer also gives practical information with regard to the selection of control equipment for automatic welding.

THE capacity of the transformers needed for any particular installation of submerged-melt welding depends on the capacity of the welding head or heads involved as well as on individual service requirements. In general, the nominal rating of the transformer (or the combined nominal ratings when two or more transformers are operated in parallel) need not be greater than the rating of the submerged-melt head and may be less if service requirements do not call for the full capacity.

Transformer capacity for any of these heads can be supplied in a number of ways. For instance, full capacity for a 2,000-amp head can be obtained by using four 500-amp welding transformers (Fig. 1) in parallel, two 1,000-amp welding transformers in parallel or a single 2,000-amp transformer. Three 750-amp transformers can also be used, although this arrangement will give slightly more transformer capacity than is needed.

SELECTING THE SIZE

With such a number of ways available for obtaining the total capacity required, the question of size of individual welding-transformer units resolves itself into consideration of the following questions:

1. Are the transformers to have stationary or portable mounting? For portable applications, 750-amp or 1,000-amp welding transformers having built-in primary control are usually favored. Such transformers provide the minimum space and weight per ampere of installed capacity.

2. Can the individual transformers also be used for manual welding? If the submerged-melt installation is to be used periodically and the welding transformers can be used to advantage for manual welding at other times, units of the 500-amp size may prove advantageous.

3. Are the desired sizes available as standard units? This factor becomes particularly important if a single transformer of higher rating than 1,000-amp is considered desirable. A single unit of almost any capacity, and for almost any primary voltage, can be built. Standard listed units, however, are much more readily available and should be used whenever possible.

In some cases, the question of initial investment may seem to favor the installation of multiple units of the 500-amp size (Fig. 1) rather than fewer units of the larger sizes. However, the larger units (Fig. 2) have considerably higher efficiency (about 8% greater), which is reflected in lower power costs. Also, they require less wiring (especially those having built-in control) so that total cost differentials, if any, are usually negligible.

If the total capacity of the welding transformers to be initially installed is less than the capacity of the submerged-melt head, it is usually advisable to select the transformers in such a way that the remaining capacity can later be added by simply connecting one or more standard units in parallel.

When welding transformers are properly connected and operated in parallel, each transformer will deliver the current for which it is adjusted, and the total current available for welding will be the sum of the output currents of all the parallel-connected units.

When transformers having built-in power factor correction are operated in parallel and only partial capacity is needed, it is always possible, and sometimes desirable, to operate with the primary of one or more transformers disconnected from the line. When a transformer is so segregated, either its capacitor circuit must be opened or its secondary circuit must be disconnected from the welding bus. If neither of these precautions is observed, the connected secondary side may cause excessive voltage to be built up in the primary winding through resonance with the capacitor circuit—a condition hazardous to the equipment.

To prevent the possible occurrence of such a hazard, the capacitor circuit of some transformers having built-in primary control is equipped with a contactor that automatically opens and closes this circuit whenever the line contactor is opened and closed. If a transformer of this type is segregated without disconnecting its secondary, no harm will result.

MOTOR-OPERATED ADJUSTMENT

Remote control of welding current should be provided for all submerged-melt installations in order to allow the welding current to be changed by means of push but-

★ OPERATION

Submerged-Melt Welding

BY R. F. WYER

Electric Welding Division, General Electric Co.

tons mounted on the voltage-control panel. When a group of smaller transformers is being operated in parallel, however, it is not always necessary to equip each unit with a motor-operated current adjuster. Instead, some can be provided with manually-operated adjusters, as shown in Fig. 3. This arrangement does not reduce the available range, but it does reduce the percentage of the range over which remote control is obtainable.

In operation, the combined output of the manually adjusted transformers is set at a value somewhat below that of the desired welding current, leaving the remainder to be obtained from units subject to remote control. Since the principal purpose and value of remote control is to provide refinement of adjustment at the voltage-control panel, this arrangement will often meet requirements successfully unless the work involves frequent current changes over a wide range or unless the transformers are located where they are not readily accessible.

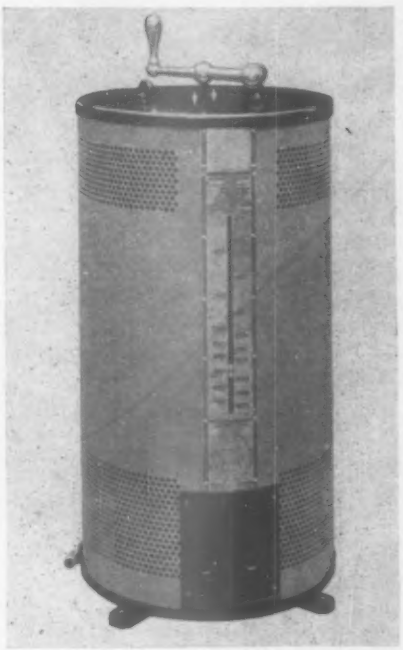

Fig. 1—A 500-amp a-c welding transformer with manual current adjuster but without primary control panel. These units may paralleled to obtain the desired capacity

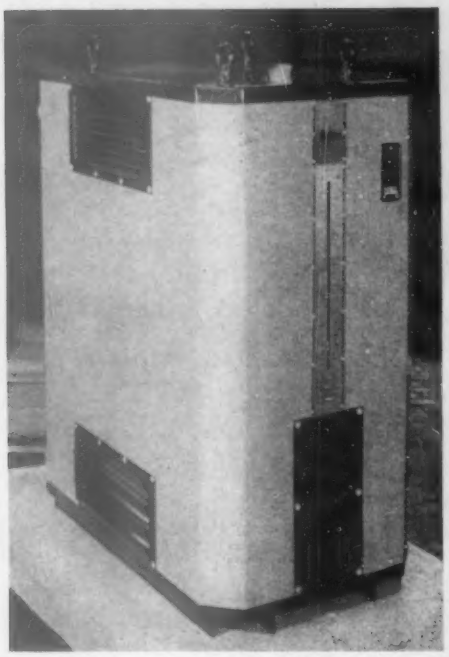

Fig. 2—A 1,000-amp transformer with primary control panel and built-in motor-operated current adjuster. Push buttons provide amperage as indicated on vertical scale

Built-in Capacitors

Help to prevent sudden changes in in voltage: By improving the power factor of the welding transformer(s), built-in capacitors aid in keeping the line voltage steady without requiring excess copper in the feeders. The reason for this advantage lies in the fact that a welding transformer (or other load) which operates in the region of 80–100% power factor can be switched on and off the feeder with much less disturbance to line voltage and to other transformers operating on the same feeder than can a transformer operating at approximately 50–60% power factor. Therefore, transformers with built-in capacitors can be operated from existing feeders with less disturbance to line voltage—or a greater number can be operated without exceeding the 5% limit for voltage regulation. These considerations alone usually warrant the use of built-in capacitors for each submerged-melt installation.

Conserve copper: If new feeders are to be installed, their size will be governed by requirements of either voltage regulation or cool operation. Built-in capacitors help in either case. If voltage regulation is the limiting factor, built-in capacitors enable feeders to be made smaller without exceeding the required limits of good voltage regulation. If cool operation is the limiting factor, built-in capacitors help to prevent the flow of most of the useless lagging current drawn by transformers not equipped with capacitors. Thus line amperes are reduced ⅓ or more—a feature which permits the use of smaller feeders, contactors, switches, primary cable and fuses than would otherwise be required for cool operation.

Help to prevent overloading of feeders: When the welding transformers are equipped with built-in capacitors, more units can be added to existing feeders without overloading than would otherwise be possible.

Help to reduce power cost: Built-in capacitors permit transformers to operate at full load without risk of

incurring charges that may be imposed for low power factor. When the transformer is operated at half load or less, leading kva is provided. This helps to offset any lagging power factor caused by motors or other induction loads on the feeder.

Other Advantages

It should not be assumed that a bank of capacitors installed across the power factor can be used to accomplish the desired results with a smaller investment.

In the first place, a bank of capacitors so installed has no corrective effect on the power factor of feeders running from the capacitors to the welding transformer(s). Therefore, these feeders have to carry more current than when transformers with built-in capacitors are used—a condition which requires larger feeders and hence more investment for more material.

Built-in capacitors help to keep the feeder voltage steady because they are automatically switched on and off the line with the welding load, thus keeping the power factor (and voltage) from changing abruptly. On the other hand, capacitors permanently connected across the feeder cannot, without extra cost, be made to change in proportion to the number of welding transformers operating on the line. Therefore, they cannot economically be made to assist in preventing sudden and serious changes in voltage.

Transformers equipped with built-in capacitors can be changed readily from one feeder to another without the necessity of also moving or installing separate capacitors. This feature is of special value for certain types of portable submerged-melt applications as well as for possible future changes in location of stationary installations.

Built-in capacitors also conserve space because they are included in the transformer case, whereas a bank of capacitors requires extra floor space and extra enclosure.

In conclusion, welding transformers with built-in capacitors are generally recommended for submerged-melt welding applications. There are rare exceptions—for example, when a single submerged-melt head is being operated from a considerably oversized feeder. Under such conditions, voltage regulation might stay within the limits required for good welding without the use of built-in capacitors.

Flexible Truck Bodies

To meet the need for standardized all-steel bodies of a flexible design, The White Motor Co., Cleveland, is distributing prefabricated commercial body sections having prepunched, coördinated assembly holes—the same design principle that was brought to a high peak of production efficiency by the aircraft industry. These holes assure accurate precision fits by clip assembly methods prior to welding. Full assembly of a wide range of body types can thus be accomplished on an assembly dolly.

The new "Type B" truck body sections include the understructure, body framing, formed vertical corners, formed roof caps, ball corners, door openings, door frames, etc. These sections can be utilized on a wide range of body sizes, varying in increments of 2 in. in length, width or height.

Fig. 3—A typical combination of welding transformers. The two 500-amp transformers on the left have motor-operated current adjusters and are controlled by one primary contactor panel. The 300-amp transformer on the right is manually adjusted and provides current for manual welding of the back-up for the submerged-melt seams

Here you see a seam made by a tungsten arc operating in an argon atmosphere. No flux is used. There is no cleaning of the weld afterwards. The weld is homogeneous and solid throughout . . . no slag inclusions and trapped flux to cause weak spots.

The tungsten-argon weld is great news for welders of aluminum. Costs are low when you consider the freedom from after-weld cleanup and flux removal. Welds have high strength. Can be made either by hand-held torches or automatic equipment. Any competent welder can use the equipment and the process.

Complete information on the tungsten-argon weld and all other types of welding for aluminum are contained in the booklet "Welding and Brazing Alcoa Aluminum". Write for a copy today.

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***MORE** people want **MORE** aluminum for **MORE** uses than ever*

ALCOA FIRST IN **ALUMINUM**

IN EVERY COMMERCIAL FORM

Short Cuts and Kinks

Rolled-on Overlays

A NEW method of applying a smooth, even layer of hard-facing is accurate to tolerances of a few thousands of an inch, minimizing or entirely eliminating finish machining or grinding. This method has a wide range of applications on parts subject to abrasive wear.

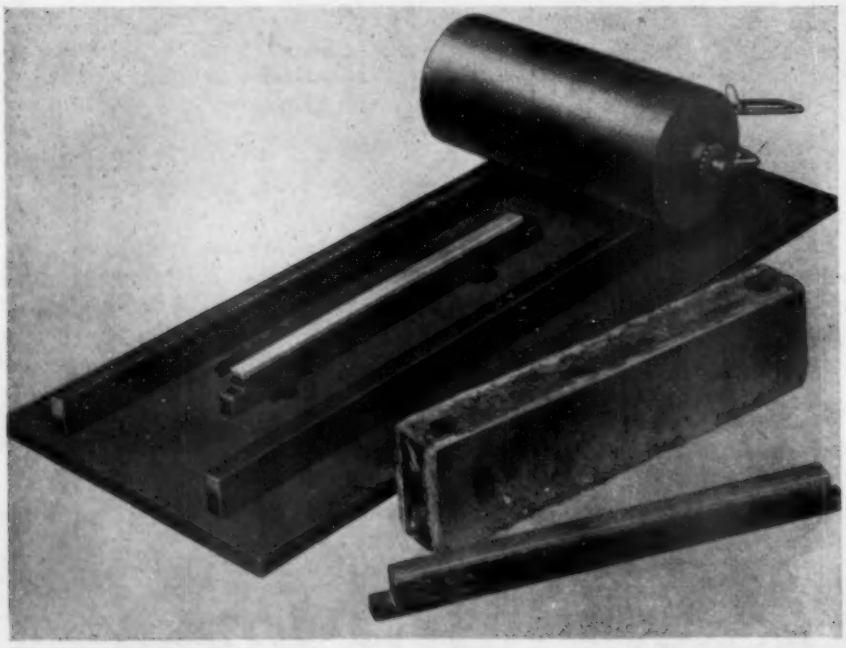
A special chromium-boron-nickel overlay is used that has the property of remaining in the plastic state between temperatures of 1,850 F to 2,050 F. While in the plastic condition, this alloy will wet and bond to steel without flowing. It can then be rolled to any desired degree of smoothness.

A typical jig for roll forming is shown in the accompanying picture. The roller rests on two guides, between which is placed the part to be overlaid. The height of the guides is adjusted to the required thickness of overlay. The smaller bars shown in the picture are each 11-in. long, and these were overlaid without difficulty. The large bar has been overlaid on both sides—a difficult task by conventional methods as this piece had to be free of all checks or porosity.

When the part to be overlaid has been placed between the guides, its top surface is built up with hard-facing alloy, applied by means of a torch in a manner similar to brazing. The alloy bonds to steel quite readily when the base metal is at a dull red. After the whole surface has been overlaid, the overlay is torch heated to its plastic range, starting at one end, and the roller rolled over the first section. A section of about 3 in. long can be rolled at a time. The next section is then heated and rolled and so on until the whole top surface is flat and even.

The technique as a whole is fairly simple, the greatest difficulty being to ascertain when the alloy has reached the plastic range. A few preliminary tries with the roller are usually necessary in order to determine this.

As the roller passes over the plastic top surface, it extrudes excess overlay over the sides of the piece. This must be removed by "hot wiping." The piece is taken out of the rolling jig and held in a vise while the torch flame is played on the overhanging alloy. As soon as the excess overlay has been brought to its plastic condition, it is wiped off the side with a square cast-iron rod. A 2-in. section of the bar is worked on in each wiping. The operation is continued until all of the excess overlay has been removed and the part has sharp corners as well as a flat top surface.



Courtesy Wall Colmony Corp.

Hard-facing overlays may be easily and quickly applied to tolerances of one or two thousandths of an inch by the hot-rolling method. The two guide rails determine the height

The coefficient of expansion of the overlaying material is slightly higher than that of steel. This means that the overlay has a tendency to arch a part which is being overlaid on only one side. The difficulty is overcome by reverse bending the part so that the application of the heated alloy will pull the piece straight. The surface to be overlaid should, of course, be on the outside of the bowed or arched piece. The part does not need to be prebent a great deal—a few practice pieces will enable the operator to determine the amount to within a few thousandths of an inch.

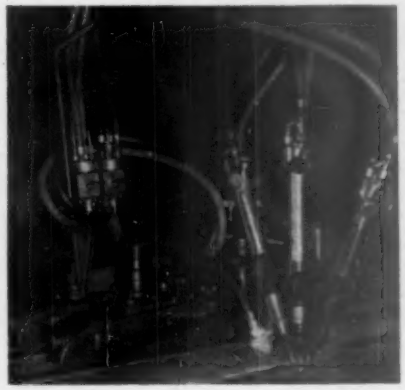
It is believed that sections as long as 30 in. and as thick as required can be overlaid in the manner just described. The width is a governing factor, but pieces up to 2 in. wide may be handled without much difficulty. The overlay alloy has a hardness of 56-62 Rockwell C and wear resistance of from 7 to 25 times that of hardened carbon steels. Its corrosion resistance is said to surpass that of stainless steels, and it is also non-sparking and non-magnetic.

* *

Beveling Warped Plates

By Lewis B. Richards

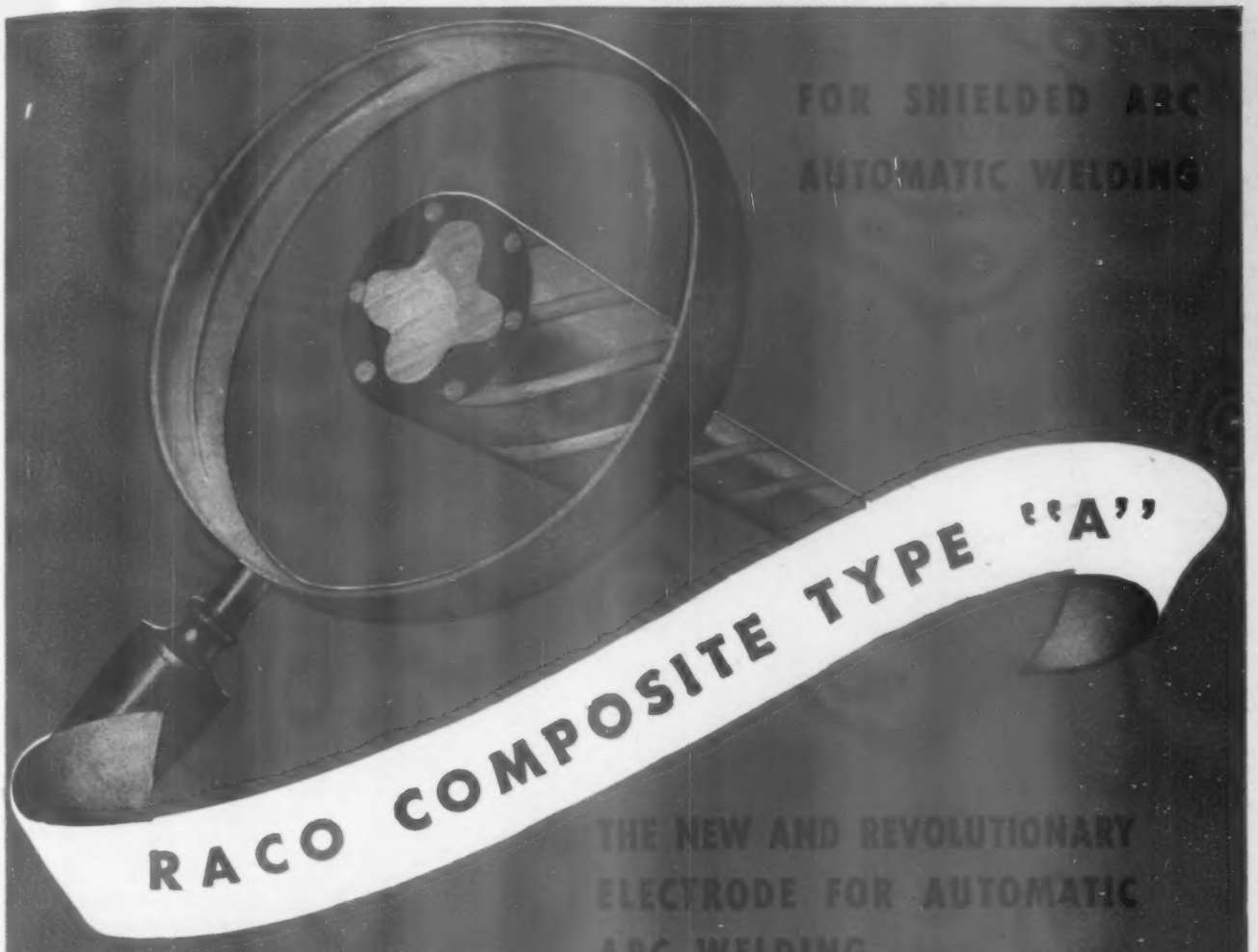
WE FOUND at Mare Island Shipyard that standard flame-cutting machines would not work properly on



Leveling attachment for a three-torch cutting machine. Guide wheel follows the hills and valleys of warped plates

plates that were not as flat as the track. The machine and torches failed to follow the valleys and depressions in warped plates, and as a result the bevels would be uneven. I submitted a suggestion to the U. S. Navy Civilian Suggestion Program to overcome this difficulty.

Briefly, my idea was to improve the operation of portable three-torch cutting machines by the use of an attachment that gave better control on uneven plates. The attachment (see picture) supports the torches on a pivot arm which rests on a guide wheel. The latter wheel rolls on the top face of the plate adjacent to the torches, which are thus raised or lowered in accordance with the plate contours. The three torches make possible simultaneous trimming and double beveling in one pass.



FOR SHIELDED ARC AUTOMATIC WELDING

RACO COMPOSITE TYPE "A"

THE NEW AND REVOLUTIONARY ELECTRODE FOR AUTOMATIC ARC WELDING

RACO Composite Type A is a heavily coated electrode in coils, providing the same physical results as heavily coated manual electrodes. With RACO Composite Type A, extremely high speeds can be obtained in any position.

It can be used with all standard automatic arc welding heads without alterations or additions.

RACO Composite Type A can be had with any of the following coatings—A.W.S. 6012; 6020; 6030 and corresponding high tensile grades. This electrode can also be furnished in three grades of hard surfacing material for building-up—RACO 25 (20-25 Rockwell C), RACO 45 (40-50 Rockwell C) and RACO 55 (50-60 Rockwell C). RACO Composite Type A Electrode is furnished in the following sizes: No. 6 (approx. 1/4"), No. 5 (approx. 7/32"), No. 4 (approx. 3/16"), and No. 3 (approx. 5/32"). Coils are 36 inches I.D., and weigh 150 to 200 pounds net.

LIGHTLY COATED AUTOMATIC ELECTRODES:—

RACO Types "D", "M", M-9 (Knurled), Plain Mill Finish and Copper Coated Wire in coils.

We draw a full line of copper coated oxy-acetylene welding wires. Furnished in coils and straightened and cut lengths.

We further manufacture a complete line of heavy coated manual electrodes for welding:—Mild Steel—High Tensile Steels—Stainless Steel—Manganese Steel—Cast Iron—Nickel—Monel—Inconel and Aluminized Steel.

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Weltronic WATERSAVER

BOOSTS WELDING PROFITS 6 Ways

- Reduces condensation, avoids transformer shorts.
- Decreases mineral deposits, repairs, down-time.
- Cuts water use, lowers water bills.
- Reduces sweating, rust, corrosion.
- Spares disposal overload, sewer pumps.
- Prevents community water famine in dry seasons.

BE WATER WISE
ECONOMIZE!

Yes, with the Weltronic Model 226DA1 WaterSaver installed on your resistance welders, you can stop worrying about the High Cost of Water. In 30, 60 or 90 seconds after the operator leaves the welder, the valve closes automatically. You'll see no more transformers blow up when the welder throws the switch in the morning. Your bill for one of the costliest of utilities will now be in direct proportion to production time. Piping will be simplified by the use of smaller returns and pumps will be idle during idle time, instead of working day and night. Lime deposits in transformers and tubes, especially irksome in certain localities, will be a headache just one-third as often and sweating, so destructive to steel and copper parts throughout the system, will be reduced to a minimum. Your community and you will profit in dry seasons because no one will be faced with a sudden disastrous shortage of pure cooling water. Be Water Wise—Economize!

WaterSaver connects to standard welder valve or we will furnish valve. Anyone can install. Attach to welder or any convenient location. Dimensions 13½" high, 7⅜" wide, 6⅜" deep. 115/230/460 volts.

Weltonic Company also manufactures Weld Timer-Contactors, Rectifiers, Induction Heaters, Motor Drives, and other electrical and electronic equipment. Write for descriptive literature, stating your interest.

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19569 W. EIGHT MILE ROAD, DETROIT 19, MICHIGAN

New Products to Use

Bench-type induction heater for brazing, soldering and hardening applications

Bench Induction Heater

THER-MONIC model 43 is a new 750-watt bench-type induction-heating generator which operates from a 120-volt, 60-cycle, single-phase power outlet. Operating at a nominal frequency of 450 kc per second, it is said to be an efficient source of high-frequency energy for hardening, brazing, soft-soldering, annealing and melting operations. Controls include automatic reset timer, start and stop control push buttons, on-and-off switch and plug connection for foot control of the heating cycle. The equipment is protected by a plate overload circuit breaker and an instantaneous line circuit breaker. The cabinet is 29 in. long, 16½ in. high, 19 5/16 in. deep. INDUCTION HEATING CORP., 389 LaFayette St., New York City 3.

* *

Oxygen Mask

A NEW front-type demand oxygen mask may be used for short-duration protection in toxic atmospheres. This self-contained breathing unit weighs 13½ lb and has a service life of about 8 to 10 minutes. It delivers an oxygen flow exactly as needed by the wearer. A needle-type by-pass valve delivers oxygen to the worker in case the automatic functioning of the demand regulator should fail. A sweep of dry oxygen over the facepiece lenses keeps them from fogging. MINE SAFETY APPLIANCES CO., Braddock, Thomas and Meade Sts., Pittsburgh 8.

* *

High Tensile Electrode

RECOMMENDED for all-position welding of low-alloy cast steel or low-alloy high-tensile rolled steels is the new Westinghouse "ACP-MO" electrode, which operates on either a-c or d-c reverse polarity. Welds made with this electrode meet the requirements of AWS-ASTM classification E-7011. WESTINGHOUSE ELECTRIC CORP., P.O. Box 1017, Pittsburgh 30.

40 to 1 with Bayflex*

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These are typical performance reports

we suggest you do a little arithmetic

Your Question:

If one Bayflex disc outperforms the ordinary coated abrasive disc 40 to 1, how much will I save per year?

In your calculation you may neglect the cost of our disc wheel. Its cost is completely absorbed in the waste time saved in changing 39 ordinary discs. Yes, turned into dollars, the saving in labor cost for slacking 39 nuts, removing 39 ordinary discs, replacing 39 ordinary discs, tightening 39 nuts — gives you our disc wheel free. Please do the arithmetic. The chances are better than 40 to 1 it will pay you handsomely to buy Bayflex.

Standard sizes in a range of grits available for stock shipment. Send for descriptive literature and prices.

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BUILT-IN FLEXIBILITY—PLUS FOR MAXIMUM SAFETY AND CUTTING SPEED

Unexcelled for cleaning castings.

For welds on angle- iron frames.

For hard-to-get-at places.

Hundreds of uses in auto repair shops

Has no equal for smoothing welds.

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MODEL NW-3:15-250 Amp.

Low Cost AC Welding

STURDY, LONG-LIFE EQUIPMENT

Portable, self-contained, self-cooled AC Arc Welder cuts welding costs to a minimum. Power is used only when the arc is drawn.

Always ready for immediate use.

Simple to apply; easy to handle.

Made in five Models: 150 to 450 Amp.

Plug-ins for 17 to 25 heat stages.

Complete with necessary accessories.

Welds Aluminum Alloys with Heliarc.

Application data sent on request

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Manufacturers of: DUALARC D. C. Welders . Smith-Dolan Induction Heaters . NUARC AND ALTERNARC A. C. Welders . Spot Welders

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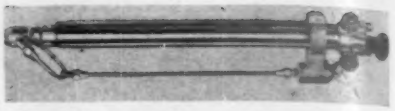


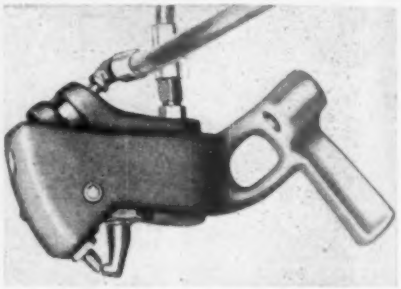
C-39 ACA-2 cutting attachment permits quick starts in cutting cold steel

Powder-Cutting Attachment

A NEW powder-cutting attachment, C-39 ACA-2, has been designed for the standard "Oxweld C-39" flame-cutting machine to make possible the cutting of stainless steels and other oxidation-resistant materials. Using appropriate sizes of standard nozzles, the attachment will enable all common types of stainless, ranging in thickness from ¼ to 3 in., to be cut at speeds between 20 and 7 in. per minute.

The attachment consists of a powder valve, a powder-nozzle and an interconnecting tube for flow of an iron-rich powder into the flame. Shapes, straight edges and bevels may all be cut by this method. LINDE AIR PRODUCTS Co., 30 E. 42nd St., New York City 17.

★ ★



"Dalhart" spot-welding gun capable of producing 3,000 spots per hour

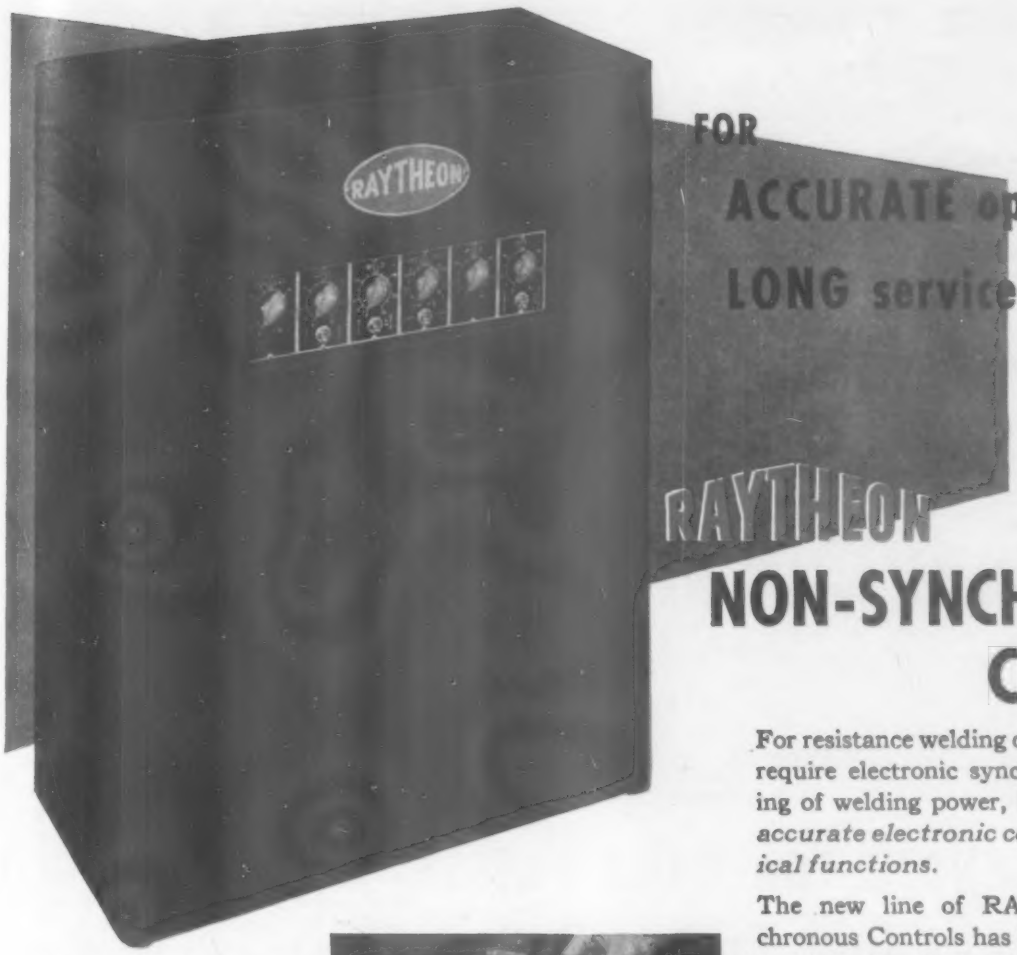
Spot-Welding Gun

"DALHART," a new double-acting, hydraulically-operated spot-welding gun, is said to extend greatly the life of electrode tips. Some of its advantages are: (1) uniform tip pressure; (2) full utilization of transformer heat; (3) mechanical speed as fast as a solenoid valve can be operated; (4) small cylinders and high fluid pressures; (5) portable gun may be attached to a bench or pedestal to make a stationary unit with foot controls; and (6) long stroke cylinder permits welding of irregularly shaped articles. DALHART ENGINEERING MFG. Co., 14827 Jefferson, Detroit 15.

★ ★

Silver-Brazing Paste

DIFFUSION paste No. 50, specifically developed for brazing carbide tool tips to steel shanks, consists of a silver-brazing alloy that has been finely pulverized and ground with the proper proportion of flux. The tip is prepared in the usual way, and the paste is then painted on the joint surfaces with a small brush. The flux begins to melt at 480 F and thus protects both the tip and joint area before heat-generated oxides can form. Viscosity of the flux is so low that the brazing alloy gently eases it out of the joint. It is available in 5 and 10 oz. jars. SHERMAN & Co., 197 Canal St., New York City 13.



FOR
ACCURATE operation
LONG service life . . .

RAYTHEON

NON-SYNCHRONOUS CONTROLS

For resistance welding operations which do *not* require electronic synchronous-precision timing of welding power, it still pays to provide *accurate electronic control of all mechanical functions.*

The new line of RAYTHEON Non-Synchronous Controls has been developed to give you just that. Note the many new and exclusive features, then send for detailed information and prices.

Write for illustrated Technical Bulletin

SPECIAL FEATURES ASSURE Accuracy, Convenience, Long life . . .

SEQUENCE-WELD TIMER designed to give full range of timing as specified by NEMA.

IGNITRON TUBE CONTACTOR using standard tube sizes.

CABINET ONLY 28″ high, 21″ wide, 10″ deep contains sequence-weld timer and standard Ignitrons up to size C. (Timer and contactor taking size D Ignitrons slightly larger.)

EASILY INTERCHANGEABLE . . . all styles of timers built on common chassis which fits into timing compartment. Permits ready substitution of NEMA 5B timer in place of 3B.

TIMER REMOVABLE without disconnecting, permitting ready inspection of components during operation.

TELEPHONE-TYPE PLUG-IN relays in sequence-weld timer are easily removed, simple to check, quickly replaceable.

QUALITY COMPONENTS, advanced design and simple circuiting assure accuracy and long life.

A–(Right) Top view of 3B Sequence Timer partly removed. Unit readily converted to 24 volt, single or two position, or 110 volt two position operation, by plugging accessory relays into sockets.

B–(Left) Sequence Timer removed for inspection while in operation condition, with all parts exposed for checking.

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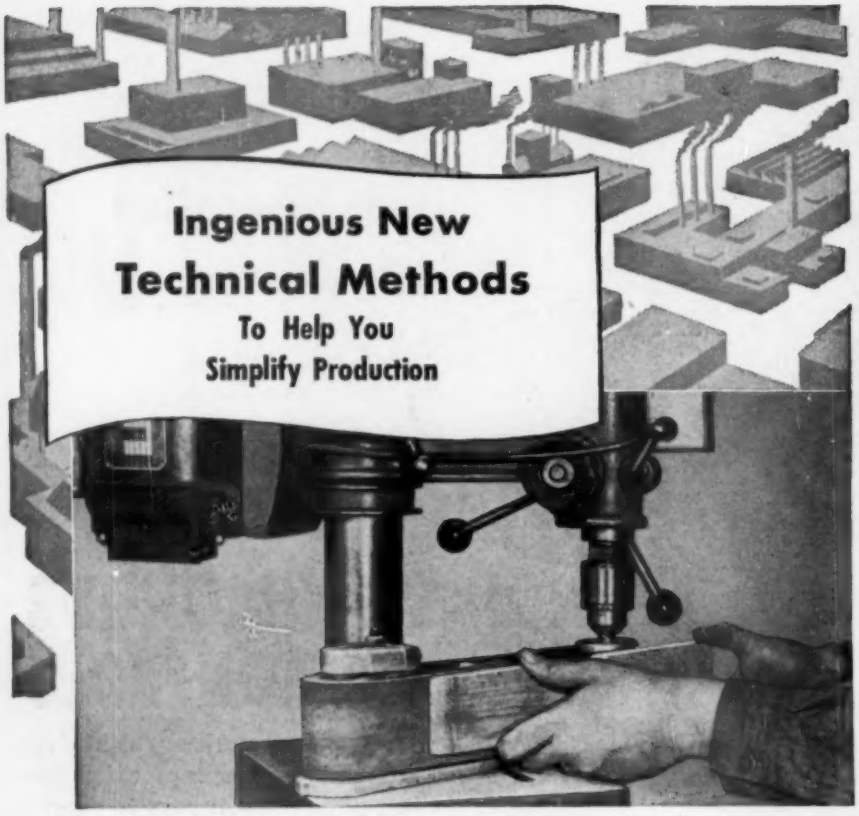


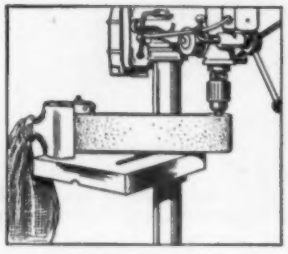
NEW BELT SANDER FOR DRILL PRESS
Does Finishing Jobs Faster, Better

A new, simple, faster method for many surface finishing jobs on wood, metal, plastic and other materials has been announced by the OK Specialty Company of Chicago. The new finishing method takes the form of the OK Belt Sander, a drill press attachment.

The new sanding device weighs less than 5 pounds. It is made up of an aluminum base with backing plate or platen, a driven pulley mounted on ground steel shaft and running on precision ground ball bearings, and cast aluminum driver pulley mounted on ½" ground steel shaft to fit into the drill press chuck.

The base of the sander is bolted to a drill press table. Merely by moving the drill press table, the attachment can be adjusted to handle sanding belts from 26" to 36" in length.

The sander takes belts from ½" to 3" in width. Two sanding belts, one coarse grit and one fine grit, are furnished with each attachment. The device comes assembled ready for use with any drill press. Most efficient performance is achieved at 3500 to 5000 RPM. The sander stands 5" high, and the base measures 10½" long by 3¼" wide.

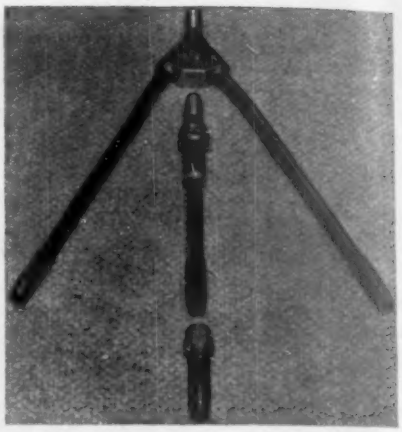


OK Belt Sander
Assembled, Ready for Action

Another time-saver on the job is chewing gum. Chewing gum may be used even when hands are busy; and under dust conditions helps to keep the throat moist—prevents "false thirst." For these reasons many plant owners make Wrigley's Spearmint Gum available to everyone.

You can get complete information from
OK Specialty Company,
4655 N. Clark St., Chicago, Ill.

AB-71



Multiflame brazing tips. Top: Style 722; Center: 721; Bottom: 723

Multiflame Brazing Tips

AIR REDUCTION has developed three new multiflame brazing tips (Nos. 721, 722 and 723), which are applicable to silver brazing to high-temperature brazing and to hard-facing. Style 721, available in 5, 6, 8 and 10 sizes, is a light, compact tip brazed to the end of a flexible, copper extension. Style 722, recommended for refrigerator manufacture, comes in sizes 5 and 7, and is a dual tube tip brazed to a similar extension. The third type, No. 723, is recommended for jobs where the operator should be farther away from his work. This tip is the same as the tip ends of the other two styles, but it is used on a standard 10 in. extension tube.

All tips will operate with such gas combinations as oxy-acetylene, oxy-hydrogen and oxy-city or natural gas. The latter two gases must be used under pressure, when brazing. AIR REDUCTION SALES CO., 60 E. 42nd St., New York City 17.

★ ★

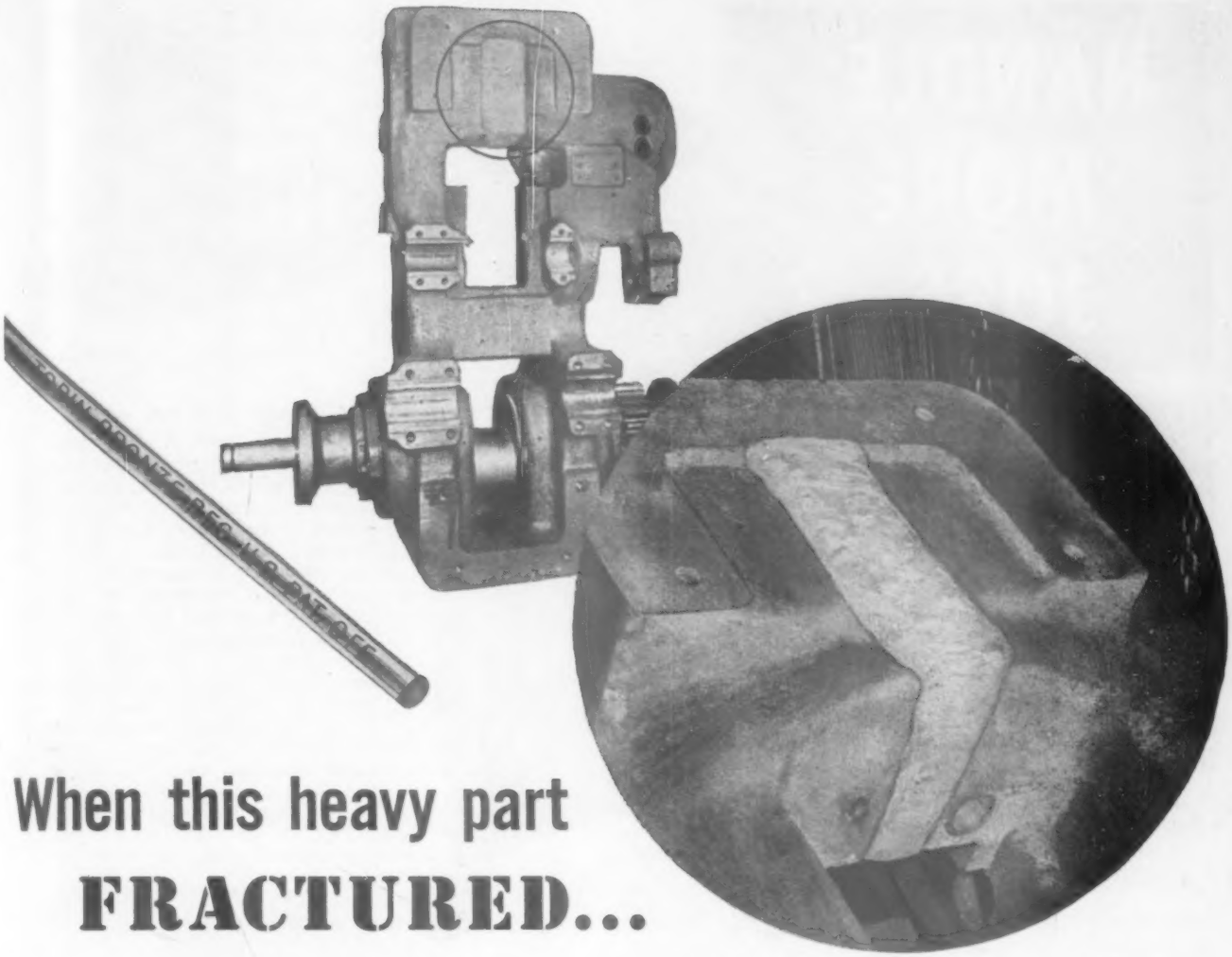
Pipe Beveling Machine

A PIPE cutting and beveling machine, available in four different sizes, is capable of cutting pipes up to 26 in. in diameter. A split horseshoe-shaped gear with spacer bolts fits over the pipe while chain fasteners hold the machine to the pipe. The adjustable torch is located at the apex of the gear and is operated by a hand crank. A complete cut and bevel on a 12-in. pipe can be made in about two minutes. Weight of the machine ranges 34 to 136 lb. H & M PIPE BEVELING MACHINE CO., 611 Petroleum Bldg., Tulsa, Okla.

★ ★

Safety Goggles

NEW spectacle-type safety goggles with a "Ful-Vue" acetate frame are said to provide increased comfort and better appearance. The goggles feature a lightweight "keyhole" bridge which has a slight amount of face form. Skull temples, which consist of a core wire encased in acetate, are easily pliable for adjustment but sufficiently rigid to maintain the new adjustment. Either Calobar super armorplate or 6-curve clear lenses are available. AMERICAN OPTICAL CO., Southbridge, Mass.



When this heavy part FRACTURED...

175 lb. of ⅜" Tobin* Bronze rod, 11 man hours of preparation and 26 hours of oxy-acetylene welding time, put this base of a cold heading machine back in service. The fracture that disabled this heavy casting might have meant costly replacement and months of unproductive delay, had it not been easily repair-welded with Tobin Bronze by the Super Arc Welding Company of Detroit.

Almost any piece of equipment made of cast iron, malleable iron, steel or copper alloys can be quickly and economically repaired by bronze welding.

Because of the low temperatures used, no serious stresses are set up and there is less chance of warping or cracking. Parts can often be welded without dismantling equipment.

Let bronze welding reclaim broken, fractured or worn equipment for you—or use this method for building up bearing surfaces—at a fraction of the cost of replacement parts.

Write for Publication B-13, containing detailed information on Anaconda Welding Rods, including Tobin Bronze and "997" (Low Fuming).

*Reg. U. S. Pat. Off.

ANACONDA
from mine to consumer

Anaconda
WELDING RODS

THE AMERICAN BRASS COMPANY
General Offices: Waterbury 88, Connecticut
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HANDLE MORE JOBS...

MAKE MORE MONEY

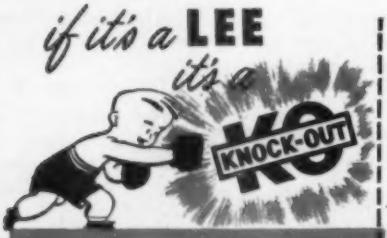
"KNOCK-OUT" A.C. ARC WELDERS

Make more money with ONE welder that handles the widest range of work... from light gauge sheet to motor blocks, frames, etc. With a *"Knock-Out"* it's easy to strike and hold an arc at all heats. Wide selection range insures proper heat for every job. There is a "Knock-Out" A. C. Arc Welder model to fit your shop.

MODELS FOR RURAL USE

Now you can get *"Knock-Out"* welders built to R. E. A. specifications for rural use. Ideal for farm or repair shop. They will repay their costs many times by making handy farm machines.

See your *"Knock-Out"* dealer or mail the coupon TODAY for illustrated bulletin.



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We would like more information on *"Knock-Out"* AC Arc Welders. Please send illustrated literature on

☐ Standard "Knock-Out" Welders.
☐ Rural "Knock-Out" Welders.

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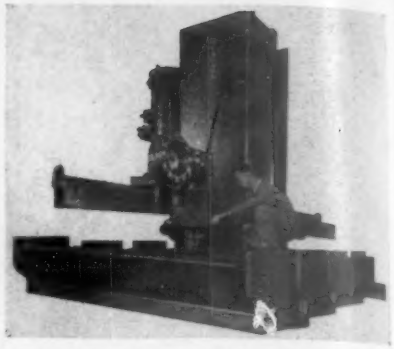

Electronically controlled submerged-melt automatic welder

Automatic Welder

FASTER arc welding, fewer passes per seam, and stronger welds at lower cost are some of the claims of the new electronically controlled automatic welder offered by the Niagara Machine and Tool Works. The electronic control varies the speed of the welding head along a track so that the length of welding is governed only by the track length. Welds perpendicular to the track are accomplished by traveling the submerged-melt head at a variable speed along the cantilever beam. A push-button control brings the power-elevated beam to any height position, permitting rapid changing from one set-up to another. NIAGARA MACHINE AND TOOL WORKS, 683 Northland Ave., Buffalo, N. Y.

* *

Miller a-c welders for inert-gas-shielded arc welding

Heliarc Welders

A NEW series of a-c welders is said to meet all of the requirements necessary for inert-gas-shielded arc welding, which necessitates a heavier welder than the metal-arc process. An adjustable high-frequency circuit is built into the welder and equipped with a variable control that enables the operator to change the high frequency voltage for any welding application. MILLER ELECTRIC MFG. Co., P.O. Box 798, Appleton, Wis.

(*Continued on page* 74)

No.	Square	Cube	Square Root	Cube Root	Logarithm	1000 × Reciprocal	No. = Diameter	
							Circum.	Area
1	1	1	1.0000	1.0000	0.00000	1000.000	3.142	0.7854
2	4	8	1.4142	1.2599	0.30103	500.000	6.283	3.1416
3	9	27	1.7321	1.4422	0.47712	333.333	9.425	7.0686
4	16	64	2.0000	1.5874	0.60206	250.000	12.566	12.5664
5	25	125	2.2361	1.7100	0.69897	200.000	15.708	19.6350
6	36	216	2.4495	1.8171	0.77815	166.667	18.850	28.2743
7	49	343	2.6458	1.9129	0.84510	142.857	21.991	38.4845
8	64	512	2.8284	2.0000	0.90309	125.000	25.133	50.2655
9	81	729	3.0000	2.0801	0.95424	111.111	28.274	63.6173
10	100	1000	3.1623	2.1544	1.00000	100.000	31.416	78.5398
11	121	1331	3.3166	2.2240	1.04139	90.9091	34.558	95.0332
12	144	1728	3.4641	2.2894	1.07918	83.3333	37.699	113.097
13	169	2197	3.6056	2.3513	1.11394	76.9231	40.841	132.732
14	196	2744	3.7417	2.4101	1.14613	71.4286	43.982	153.938
15	225	3375	3.8730	2.4662	1.17609	66.6667	47.124	176.715
16	256	4096	4.0000	2.5198	1.20412	62.5000	50.265	201.062
17	289	4913	4.1231	2.5713	1.23045	58.8235	53.407	226.980
18	324	5832	4.2426	2.6207	1.25527	55.5556	56.549	254.469
19	361	6859	4.3589	2.6684	1.27875	52.6316	59.690	283.529
20	400	8000	4.4721	2.7144	1.30103	50.0000	62.832	314.159
21	441	9261	4.5826	2.7589	1.32222	47.6190	65.973	346.361
22	484	10648	4.6904	2.8020	1.34242	45.4545	69.115	380.133
23	529	12167	4.7958	2.8439	1.36173	43.4783	72.257	415.476
24	576	13824	4.8990	2.8845	1.38021	41.6667	75.398	452.389
25	625	15625	5.0000	2.9240	1.39794	40.0000	78.540	490.874
26	676	17576	5.0990	2.9625	1.41497	38.4615	81.681	530.929
27	729	19683	5.1962	3.0000	1.43136	37.0370	84.823	572.555
28	784	21952	5.2915	3.0366	1.44716	35.7143	87.965	615.752
29	841	24389	5.3852	3.0723	1.46240	34.4828	91.106	660.520
30	900	27000	5.4772	3.1072	1.47712	33.3333	94.248	706.858
31	961	29791	5.5678	3.1414	1.49136	32.2581	97.389	754.768
32	1024	32768	5.6569	3.1748	1.50515	31.2500	100.531	804.248
33	1089	35937	5.7446	3.2075	1.51851	30.3030	103.673	855.299
34	1156	39304	5.8310	3.2396	1.53148	29.4118	106.814	907.920
35	1225	42875	5.9161	3.2711	1.54407	28.5714	109.956	962.113
36	1296	46656	6.0000	3.3019	1.55630	27.7778	113.097	1017.88
37	1369	50653	6.0828	3.3322	1.56820	27.0270	116.239	1075.21
38	1444	54872	6.1644	3.3620	1.57978	26.3158	119.381	1134.11
39	1521	59319	6.2450	3.3912	1.59106	25.6410	122.522	1194.59
40	1600	64000	6.3246	3.4200	1.60206	25.0000	125.66	1256.64
41	1681	68921	6.4031	3.4482	1.61278	24.3902	128.81	1320.25
42	1764	74088	6.4807	3.4760	1.62325	23.8095	131.95	1385.44
43	1849	79507	6.5574	3.5034	1.63347	23.2558	135.09	1452.20
44	1936	85184	6.6332	3.5303	1.64345	22.7273	138.23	1520.53
45	2025	91125	6.7082	3.5569	1.65321	22.2222	141.37	1590.43
46	2116	97336	6.7823	3.5830	1.66276	21.7391	144.51	1661.90
47	2209	103823	6.8557	3.6088	1.67210	21.2766	147.65	1734.94
48	2304	110592	6.9282	3.6342	1.68124	20.8333	150.80	1809.56
49	2401	117649	7.0000	3.6593	1.69020	20.4082	153.94	1885.74
50	2500	125000	7.0711	3.6840	1.69897	20.0000	157.08	1963.50
51	2601	132651	7.1414	3.7084	1.70757	19.6078	160.22	2042.82
52	2704	140608	7.2111	3.7325	1.71600	19.2308	163.36	2123.72
53	2809	148877	7.2801	3.7563	1.72428	18.8679	166.50	2206.18
54	2916	157464	7.3485	3.7798	1.73239	18.5185	169.65	2290.22
55	3025	166375	7.4162	3.8030	1.74036	18.1818	172.79	2375.83
56	3136	175616	7.4833	3.8259	1.74819	17.8571	175.93	2463.01
57	3249	185193	7.5498	3.8485	1.75587	17.5439	179.07	2551.76
58	3364	195112	7.6158	3.8709	1.76343	17.2414	182.21	2642.08
59	3481	205379	7.6811	3.8930	1.77085	16.9492	185.35	2733.97
60	3600	216000	7.7460	3.9149	1.77815	16.6667	188.50	2827.43
61	3721	226981	7.8102	3.9365	1.78533	16.3934	191.64	2922.47
62	3844	238328	7.8740	3.9579	1.79239	16.1290	194.78	3019.07
63	3969	250047	7.9373	3.9791	1.79934	15.8730	197.92	3117.25
64	4096	262144	8.0000	4.0000	1.80618	15.6250	201.06	3216.99
65	4225	274625	8.0623	4.0207	1.81291	15.3846	204.20	3318.31
66	4356	287496	8.1240	4.0412	1.81954	15.1515	207.35	3421.19
67	3489	300763	8.1854	4.0615	1.82607	14.9254	210.49	3525.65
68	4624	314432	8.2462	4.0817	1.83251	14.7059	213.63	3631.68
69	4761	328509	8.3066	4.1016	1.83885	14.4928	216.77	3739.28
70	4900	343000	8.3666	4.1213	1.84510	14.2857	219.91	3848.45
71	5041	357911	8.4261	4.1408	1.85126	14.0845	223.05	3959.19
72	5184	373248	8.4853	4.1602	1.85733	13.8889	226.19	4071.50
73	5329	389017	8.5440	4.1793	1.86332	13.6986	229.34	4185.39
74	5476	405224	8.6023	4.1983	1.86923	13.5135	232.48	4300.84
75	5625	421875	8.6603	4.2172	1.87506	13.3333	235.62	4417.86
76	5776	438976	8.7178	4.2358	1.88081	13.1579	238.76	4536.46
77	5929	456533	8.7750	4.2543	1.88649	12.9870	241.90	4656.63
78	6084	474552	8.8318	4.2727	1.89209	12.8205	245.04	4778.36
79	6241	493039	8.8882	4.2908	1.89763	12.6582	248.19	4901.67
80	6400	512000	8.9443	4.3089	1.90309	12.5000	251.33	5026.55
81	6561	531441	9.0000	4.3267	1.90849	12.3457	254.47	5153.00
82	6724	551368	9.0554	4.3445	1.91381	12.1951	257.61	5281.02
83	6889	571787	9.1104	4.3621	1.91908	12.0482	260.75	5410.61
84	7056	592704	9.1652	4.3795	1.92428	11.9048	263.89	5541.77
85	7225	614125	9.2195	4.3968	1.92942	11.7647	267.04	5674.50
86	7396	636056	9.2736	4.4140	1.93450	11.6279	270.18	5808.80
87	7569	658503	9.3274	4.4310	1.93952	11.4943	273.32	5944.68
88	7744	681472	9.3808	4.4480	1.94448	11.3636	276.46	6082.12
89	7921	704969	9.4340	4.4647	1.94939	11.2360	279.60	6221.14
90	8100	729000	9.4868	4.4814	1.95424	11.1111	282.74	6361.73
91	8281	753571	9.5394	4.4979	1.95904	10.9890	285.88	6503.88
92	8464	778688	9.5917	4.5144	1.96379	10.8696	289.03	6647.61
93	8649	804357	9.6437	4.5307	1.96848	10.7527	292.17	6792.91
94	8836	830584	9.6954	4.5468	1.97313	10.6383	295.31	6939.78
95	9025	857375	9.7468	4.5629	1.97772	10.5263	298.45	7088.22
96	9216	884736	9.7980	4.5789	1.98227	10.4167	301.59	7238.23
97	9409	912673	9.8489	4.5947	1.98677	10.3093	304.73	7389.81
98	9604	941192	9.8995	4.6104	1.99123	10.2041	307.88	7542.96
99	9801	970299	9.9499	4.6261	1.99564	10.1010	311.02	7697.69

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WELDING

A fast, easy way to join

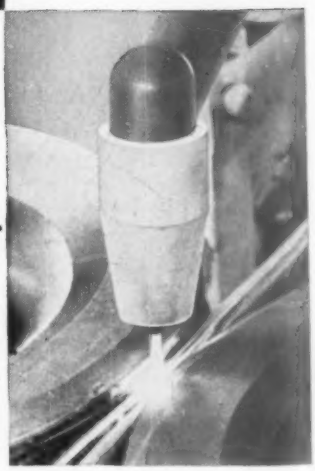
- STAINLESS STEEL
- HIGH-CARBON STEEL
- ALUMINUM
- MAGNESIUM
- BRASS
- COPPER
- EVERDUR
- MONEL
- INCONEL
- SILVER

Linde's HELIARC process is a new and different method of welding with the electric arc, in which the welding action is shielded by an inert gas—usually argon.

Joints welded with the HELIARC process have exceptionally high quality. They are clean because HELIARC welding eliminates flux. Joints are so smooth, even, and neat that usually no finishing treatment of any kind is required.

Butt, lap, tee, corner, and angle joints are easily made on rolled, cast, extruded, or forged parts of stainless steel and practically all non-ferrous alloys of any commercially used thickness.

HELIARC welding can be done manually or with machines and is equally practical for mass production or job lots.



Linde service engineers are always available to help with problems of treating, cutting, joining, and forming metals.

Call or write any Linde office for information.

The word "Heliarc" is a trade-mark of The Linde Air Products Company.

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd St., New York, N. Y. UCC Offices in Other Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

15,300 lb. mill housing repaired by brazing

at one-third the cost of a new casting

1) To replace this *15,300 pound cold rolling mill housing would have taken two months—too long a shutdown when every pound of production was vital to the war effort.*

2) Instead it was brazed *with 250 pounds of ⅜" diameter Chase low fuming bronze rod. In this close-up of the fractured casting the repair braze can be plainly seen.*

3) One week later *the repaired housing is assembled, and the rolling mill back in operation. Cost of brazing: about one-third the cost of a new housing.*

THIS is another instance—one of many such case histories on file—of how Chase Bronze Welding Rods save man-hours and cut costs ...insure fine quality welds wherever used in industry today.

TO FIND OUT MORE about Chase welding and brazing rods, write, on company letterhead, for complimentary copy of our handbook, "Chase Welding Rods—and Welding of Brass, Copper, Bronze." Simply address: Chase Brass & Copper Co., attention Dept. WE-87.

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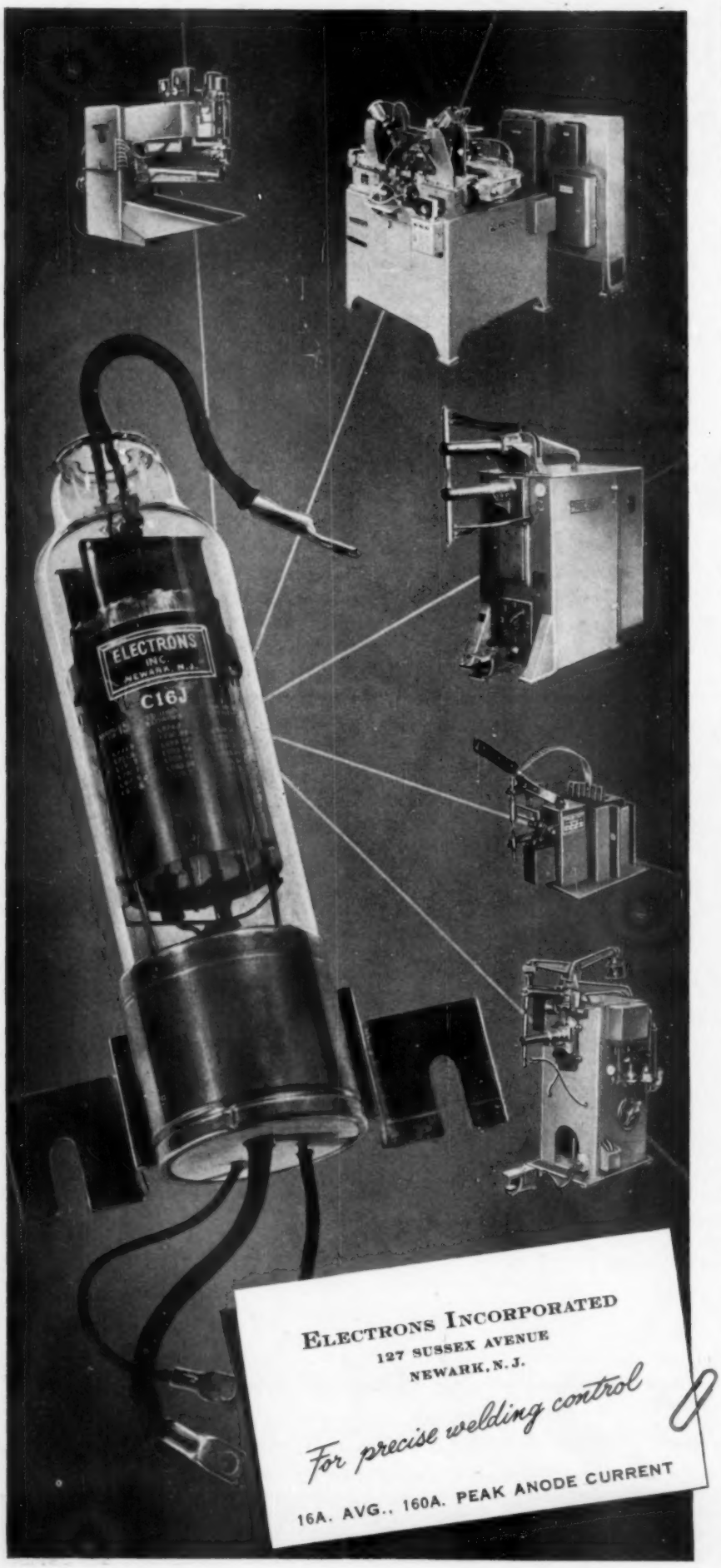
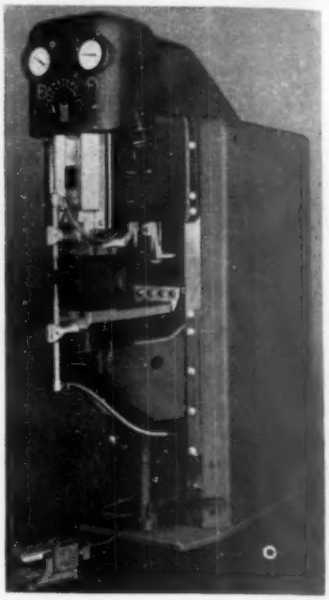
ALBANY† ATLANTA† BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO. LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WASHINGTON† (†Indicates Sales Office Only)



NEW PRODUCTS TO USE

(*Continued from page 68*)



One of Progressive's new press-type spot welders. They range from 50 to 500 kva

Improved R-W Machines

AN improved line of press-type spot and projection welders ranging from 50 to 500 kva capacity is offered for continuous high-production runs and the accommodation of various types and sizes of work on a job-lot basis. Provision can be made for pulsation welding, resistance upsetting and resistance-brazing, also for preheating, postheating or tempering of the work while still in the machine.

Machine operation on all sizes up to 250 kva is obtained through either air or hydraulic actuation. On larger machines, hydraulic operation is standard. Throat depths are optional in 18, 24 or 30 in. (projection welding) or 18 to 36 in. (spot welding). Machines ranging from 100 to 250 kva are offered as combination projection and spot welders and have T-slotted platens and sleeves and spacers for mounting spot-welding horns.

Size No. 1 machines (50 and 75 kva) are offered as spot or projection welders. The latter is convertible for spot welding by adding horns, electrode holders and electrodes. The straight spot welder with swiveling lower arm is also convertible to a projection welder. PROGRESSIVE WELDER CO., 3050 E. Outer Drive, Detroit 12.

* *

Induction Motors

DESIGNED of splash proof construction, the new "E-M" heavy-duty squirrel-cage induction motors are offered for large-power drives ranging from 100 to 1,000 hp at speeds of up to 1,800 rpm. Features are a fabricated enclosed steel frame, access plates designed for quick removal and sealed bearings that can be cleared and refilled without motor disassembly. ELECTRIC MACHINERY MFG. CO., Minneapolis 13, Minn.

FACTS WORTH NOTING

RUFLUX P

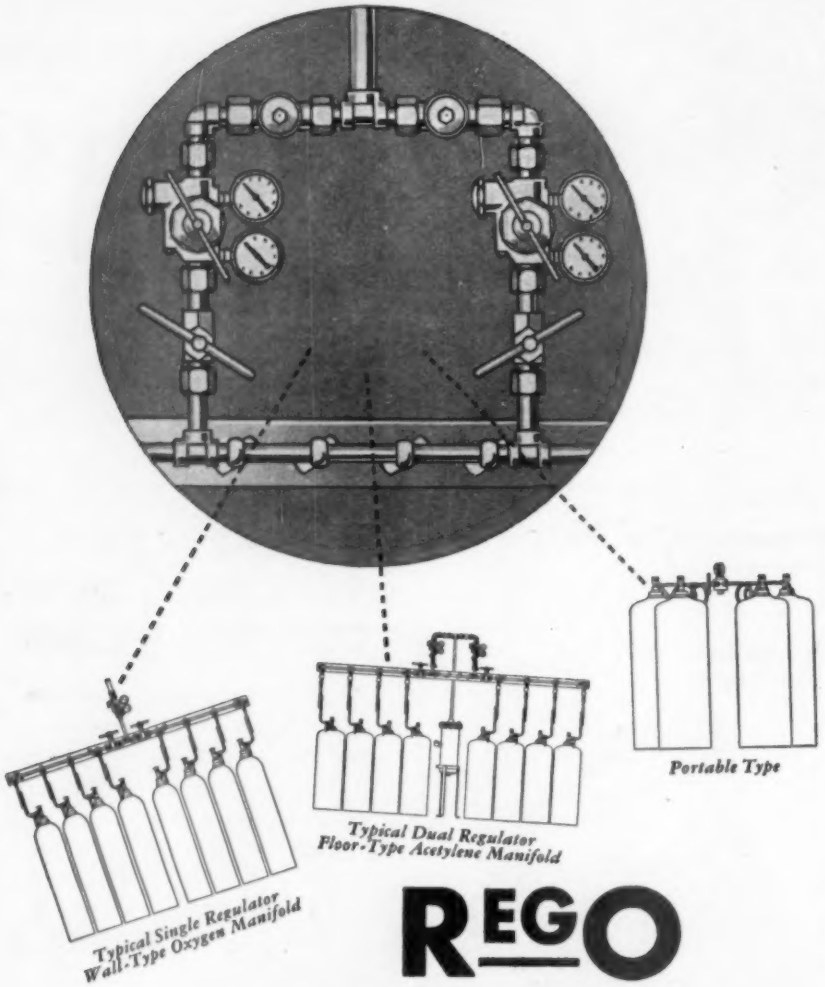
USED IN WELDING ROD FORMULATION

RUFLUX P is particularly desirable in welding rod formulation as an arc stabilizer. It contains no injurious impurities. Its chemical analysis shows approximately 73% TiO_2, 19% K_2O with the balance moisture, ignition loss, and oxides of zirconium, silicon, aluminum, iron, calcium, etc. It is milled to 5% on a 200 mesh screen.

TAM

TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 Broadway, New York City *General Offices and Works:* Niagara Falls, N. Y.



REGO

CONSTRUCTION
Produces Better Manifolds

● RegO design means safe performance, long life and low maintenance costs. Here are some of the construction features you get when you specify RegO Manifolds...

Unit Construction...The header section of each RegO Manifold is virtually one-piece; extra-heavy seamless brass pipe is run through the forged brass header fittings, the cylinder station shut-off valves and the master shut-off valves . . . all permanent connections are then silver-brazed. The header assembly is bolted to a heavy steel I-beam to assure permanent alignment.

Precision Regulation... large capacity two-stage RegOlators assure constant and uniform delivery pressure to the pipe system.

Extra Convenience... standard RegO Manifold construction provides individual shut-off valves at each cylinder station . . . this design permits any one cylinder to be disconnected without shutting down the entire manifold. Master shut-off valves control each main branch.

Rigid Tests... header pipe, valve bodies and fittings withstand pressure up to 10,000 psi and each complete RegO Manifold is subjected to a sustained air pressure test of up to 2,000 psi.

There Is A RegO Manifold to Fit Your Most Exacting Requirements

REGO MANIFOLDS *for* Oxygen • Acetylene • Hydrogen • Nitrogen
and other high pressure gases

The BASTIAN-BLESSING Company

4201 W. Peterson Avenue Chicago 30, Illinois

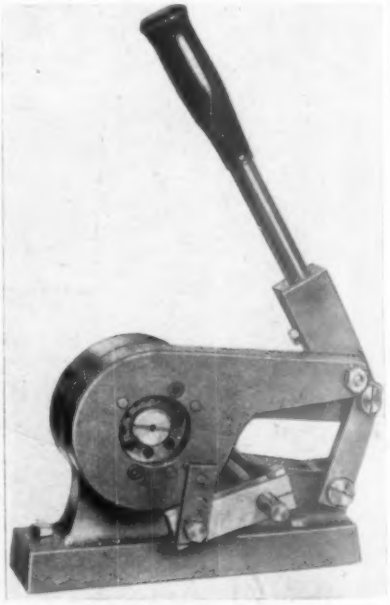
Pioneer and Leader in the Design and Manufacture of Precision Equipment For Using and Controlling High Pressure Gases

10-kva butt welder joins steel stock up to ½ in. diameter

Butt Welder

DESIGNED for welding of wire and other round steel stock up to ½ in. diameter is a 10-kva flash and butt welder, model "BA-10," operated by a solenoid controlled by a foot switch. An air-operated model is also available for high-speed welding jobs. Either machine has five heat stages (normal draw is only 45 amp), and pressure can be applied while the heat is on or off. LARKIN LECTRO PRODUCTS CORP., 160 W. 146th St., New York City 30.

★ ★



Rod parter No. 1 cuts steel bars up to ⅝ in. in diameter. No. 2 cuts up to ⅝ in.

Rod Cutter

A NEW rod cutter known as the Di-Acro "Rod Parter" incorporates a multiple leverage arrangement for ease of operation. Three roller bearings reduce friction and help to increase production. Rods of exceptionally small diameters may be cut to very close tolerances as can larger-size rods. The cutter is available in two sizes with capacities of up to ⅜ in. and up to ⅝ in. cold-rolled steel bars. O'NEIL-IRWIN MFG. CO., 385 8th Ave., Lake City, Minn.

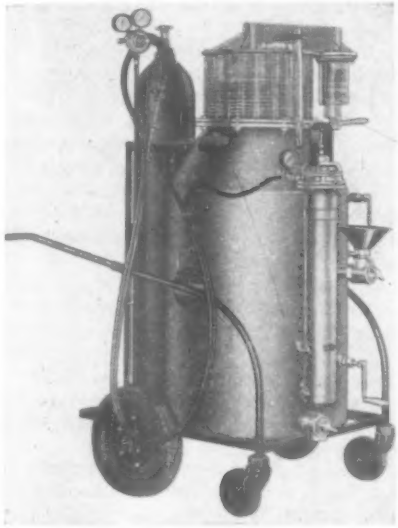
Twin carbon-arc torch increases work range versatility of arc welders

Carbon-Arc Torch

A NEW carbon-arc torch which operates on either a-c or d-c increases the versatility of arc welders for non-ferrous welding, brazing or heating jobs. Current-conducting members of the twin-carbon unit are two concentric metal tubes insulated by a fiber sleeve one sliding within the other to maintain alignment for adjustment of the arc gap. Control is from a button located on the handle. By a light pressure on the control button the arc gap can be held at a constant length as the carbons are consumed.

This torch accommodates electrodes ranging from ¼ to ⅜ in. diameter without using adaptors. Its simplified control renders it suitable for brazing thin sheet metal or other kinds of brazing, for non-ferrous welding, hard-facing, preheating, spot hardening and spot annealing. C. E. PHILLIPS & Co., 2750 Poplar St., Detroit 8.

* *



Model AP acetylene generator

Acetylene Generators

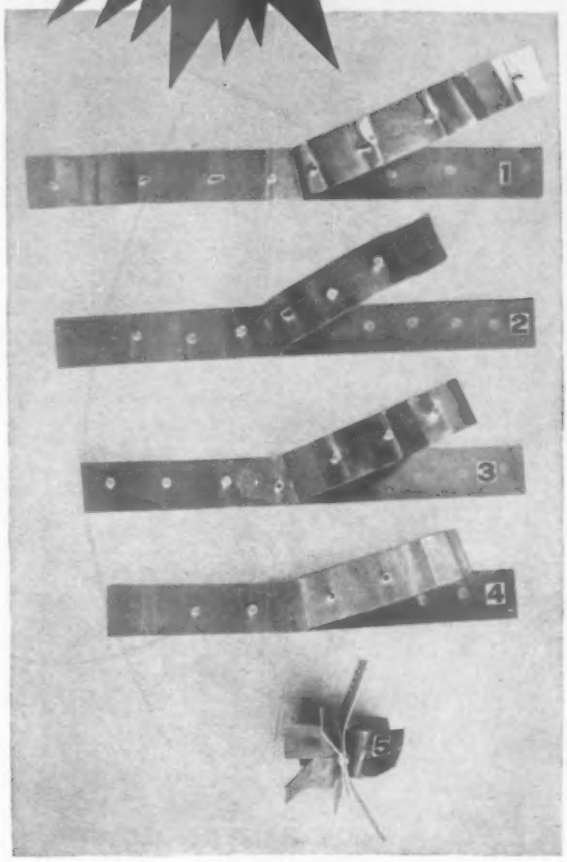
DESIGNED primarily for use in oil fields, the Model AP series of visible supply acetylene generators are built in 25, 50 and 100 lb capacities and may be mounted on portable trucks. Size of the mesh through which the carbide passes is ¼ by 1/12 in. THE SIGHT FEED GENERATOR CO., Richmond, Ind.

* *

Pressure-Lock Wrenches

A STEEL insert in the handle of pressure lock wrenches Nos. 7 and 9 is featured by BMC MFG. CORP., 5–9 Griswold St., Binghamton, N. Y. The insert is said to give more resistance to heat when the wrenches are used in connection with welding and brazing operations. The steel is situated in the entire length of the plastic handle.

NOW... HIGH STRENGTH Spot Welds in Aluminum, Steel, and other alloys with a *Versatile* ACRO WELDER



1 2 pieces 3S0 aluminum .020 thick.

2 2 pieces 52S-½H aluminum .050 thick.

3 2 pieces 3S-½H aluminum .032 thick.

4 One piece 52S-½H aluminum .050 thick to one piece 24S0 aluminum .050 thick.

5 5 pieces 52S-½H aluminum each .050 for total thickness .250.

MEETS ALL TEST REQUIREMENTS

Look at the "buttons" in the spot-welds illustrated. An independent testing laboratory thoroughly checked the welds on these and other popular aluminum alloys up to .064 thick. In all instances mechanical tests and microscopic and radiographic inspections show that minimum strength requirements and specifications either were equalled or exceeded!

LOWEST COST EQUIPMENT

The welds were made on a standard low cost ACRO 50 KVA transformer type A-C Welder fitted with the newly developed ACRO Sequence Control . . . a complete low-cost welder so versatile that simple finger-tip control lets any operator quickly change to steel and other alloys for equally high-strength spot welding results. Original cost and maintenance costs are only a fraction ordinarily necessary for more complicated equipment.

CONVERT YOUR PRESENT WELDER

If you wish, the low cost ACRO Sequence Control itself can be installed to your present A-C spot welders to convert them for aluminum. Full installation is quick, simple and easy with complete wiring diagrams and operating instructions furnished with each control.

Write for Specification Bulletin

Sales Representatives:
Some territories are still available. Write for details.

ACRO WELDER MFG. CO.

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1825 West St. Paul Avenue • Milwaukee 3, Wisconsin

For Emergency Repairs

...weld cast iron with Ampco-Trode 10 —save time and money...

Typical of the way Ampco-Trode 10 saves money for its users is this tricky repair job. This cast-iron road-grader drive housing was badly damaged when a drive shaft broke. Replacements were not available. Ampco-Trode 10 took over. Only a slight preheat was necessary so that the welder had no trouble in handling the casting. All joints were V'd out and the welding done in two passes — once with an 1/8" rod and again with 3/16" rod.

One of the breaks passed through a machined flange. But the fact that Ampco-Trode 10 provided a machineable deposit as well as good strength and ductility solved this problem.

You, too, can save time and money with Ampco-Trode 10. This all-purpose aluminum bronze electrode gives you these important welding advantages:

- **Welds dissimilar metals**—steel to clean cast iron; steel or cast iron to bronze, brass, and copper; and all these to nickel alloys.
- **Ideal for bearing applications and overlays** — where hardness and resistance to wear are essential factors.
- **Resists corrosion** — this quality is extremely useful when fabricating process-industry equipment.

Get a supply of these easy-to-use, money-saving aluminum bronze electrodes today. See your nearest Ampco distributor. Write us for latest Ampco-Trode 10 bulletin giving additional facts.

AMPCO

Ampco-Trode 10 is a product of

Ampco Metal, Inc.

Department WE-8 Milwaukee 4, Wis.

W-101

News of the Industry

ASME Learns New Wrinkles in Welding

DESCRIBING the centrifugal casting process as it applies to stainless and carbon-steel tubes, J. W. MacKay, sales engineer, American Cast Iron Pipe Co., Birmingham, Ala., told ASME members of the procedure developed for welding nickel-steel forgings to cast carbon-steel tubing to produce highly critical ship propeller shafting. His paper was presented at the second of two sessions on Metals Engineering held in connection with the semiannual meeting of the American Society for Mechanical Engineers, June 15–19 at the Stevens Hotel, Chicago.

Welding of the propeller shafts was both manual and automatic, said Mr. MacKay. Automatic welding was done with d-c straight polarity, 325 amp at 28–30 volts, using 1/4-in. E-9030 welding wire. The shaft was preheated to 450–500 F, and preheat temperature was maintained during welding by a gas burner placed directly under the center of the weld. Temperature was checked with temperature-indicating crayons.

The shaft was placed on electrically driven positioning rollers and revolved during welding at a speed equal to the rate of deposition. The welds were magnetic-particle-inspected after the first pass. Stress relieving was done in a special refractory gas-fired furnace by heating the shaft while it rotated at 350 F per hr to 1,150–1,200 F, holding the latter temperature for 6 hr and then cooling the shaft at a rate not exceeding 125 F per hr. This method of stress relieving gave straight shafts. A final magnetic-particle inspection was made after the excess weld metal had been machined off.

A procedure developed for the pressure welding of airplane propeller barrels of SAE 4345 alloy steel was described at the same ASME session by G. W. Motherwell, works manager of the Wyman Gordon Co., Worcester, Mass. The oxy-acetylene pressure welding process was chosen for this application because it showed promise of producing adequate welds with a lower initial investment than would be required for flash welding. One of the most difficult problems involved was that of uniformly and simultaneously heating either three or four kidney shaped sections to the proper temperature. The size of the flame ports on the heating heads was adjusted by trial and error until a uniform heat distribution was obtained throughout the weld section, and the heating heads were balanced so that all sections were heated at the same rate. Tensile strengths of test welds ranged from 140,000 to 144,500 psi, elongation ranged from 9.5% to 19.5% in 2 in. and hardness from 293 to 321 Brinell.

Welding Research Discussed in British Technical Paper

THE British Welding Research Association has formed a Welding Research Board which will handle the functions of the association, carry out investigations and formulate programs. Funds thus far available have limited research to exploratory and fundamental work on a coöperative basis in industrial and university laboratories.

According to the British technical journal, *Engineering*, it has been proposed to centralize part of this work at Abington, near Cambridge, where a 25-acre site has been acquired for the development of a research station. The investigation will include scale experiments involving static, dynamic and repeated loading so that the properties of welded structures, particularly rigid frameworks, can be determined. Similar work on welded pressure vessels will also be undertaken.

The work will be carried out by four main committees which will deal with ferrous metals, engineering, resistance welding and light alloys. The first of these committees is considering the revision of the British Standard Specification for mild-steel welding electrodes to bring it into line with present knowledge and requirements. The engineering side of the research program is being directed to determine how a welded structure behaves under load so that it can be designed to secure the fullest advantages offered by welded joints.

This work was begun in 1937 and is now proceeding under the direction of Professor J. F. Baker at the engineering laboratories, Cambridge. Sufficient experimental data have now been obtained to form the basis of a statement on the real load-carrying capacity of steel beams and certain types of rigidly-jointed portal frames. Most important result, however, is that it is now possible to proceed with a new method of design. It is hoped that structures worked out in accordance with this method will be as much as 25 to 40% lighter than those produced in accordance with more normal procedure.

Welding Helps Rebuild House of Commons

IN order to eliminate the noise of riveting, which Members of Parliament would find distracting to debate, welding is being extensively used in rebuilding the House of Commons, London. All-position electrodes are employed, because the majority of welds are made in the vertical position.

* *

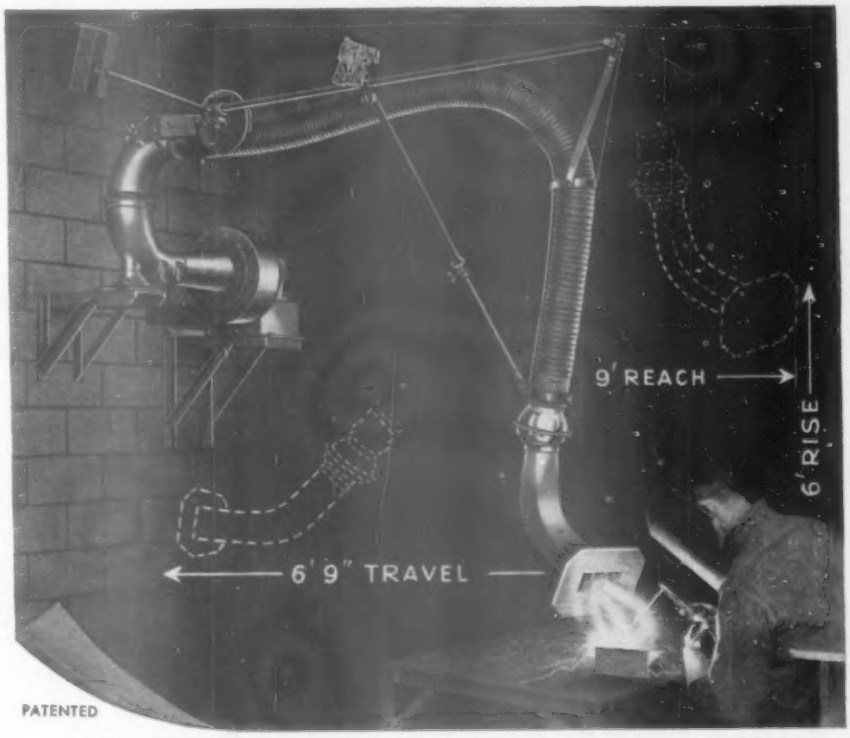
RFC Buys Oxygen Plants

UNDER a priority to acquire surplus property for small business, the Reconstruction Finance Corp. has purchased surplus oxygen plants located in San Francisco, Los Angeles and Oakland, Calif. These facilities will be resold to Stuart Oxygen Co., San Francisco.

"I WORK IN CLEAN FUME-FREE AIR —thanks to our RUEMELIN FUME COLLECTOR"

Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated *at their source*, thus improving working conditions, lessening fatigue and paving the way for increased plant production.

The Ruemelin Fume Collector hood can be instantly placed where needed anywhere in the booth welding area. No tedious adjustments necessary. Just pull the inlet hood to the welding position and you are ready to go. Approved by state industrial commissions and by compensation insurance companies. Simple to install. Thousands in service. Many users send in repeat orders. Write for bulletin 37-C today.



Standard Model D-5310 with hood reaching out 9 feet from wall. Also available in Long Reach Model D-5342 with hood reaching out 15 feet from wall.

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Build Welded Tank for Acid Storage

INGALLS IRON WORKS, Birmingham, Ala., recently constructed for U. S. Phosphoric Products Corp., East Tampa, Fla., an all-welded tank for the storage of acid. The tank has a capacity of 676,000 gallons and measures 63 ft in diameter by 29 ft high. The $\frac{7}{8}$-in. shell and bottom plates were butt welded and the $\frac{3}{8}$-in. roof plates were lap welded. An unusual feature of this tank is that the roof, made of dished plate segments, is self-supporting.

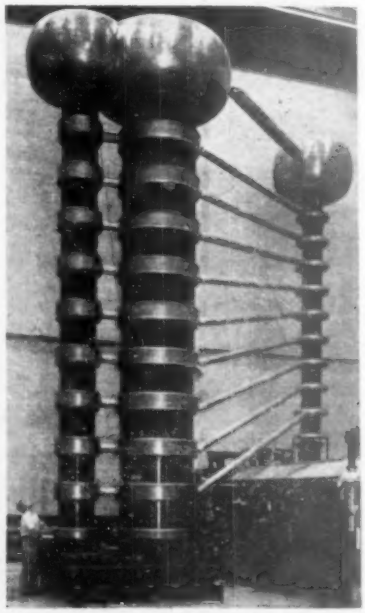
* *

Conduct X-ray Program at National Bureau of Standards

SCIENTISTS at the National Bureau of Standards are engaged in an extensive research to determine the effectiveness of concrete as a protective barrier against million-volt, wide-beam X-rays. One of the basic aims of the project is to collect data from which exact wall thicknesses and most desirable types of construction necessary for maximum short-wave X-ray protection can be calculated.

To determine protection standards, a 1,500,000-volt X-ray machine in the Bureau's laboratories has been converted to produce beams of varying widths. It is mounted so that it can be directed downward into a "radiation pit" about 6 ft square and located 20 ft below the target of the X-ray tube.

During the investigations, 2½-ton slabs of concrete, each 6 in. thick, were placed over the mouth of the pit, one at a time, to enable investigators to vary the thickness of the protective barrier from 6 in. to 5 ft. Arrangements have also been made for producing protective "sandwiches" of lead and concrete in alternate layers. At present, the best proportions between these two materials are entirely unknown.



Equipment at National Bureau of Standards laboratory. The generator encased in the central column is capable of delivering an X-ray excitation current of 25 ma at 1,400,000-volts

Study German Method of Supersonic Testing

GERMAN scientists developed during the war a supersonic testing method which can locate bubbles in sheet metal too minute for detection by X-ray or magnetic techniques. The method is detailed in a report prepared by Dr. G. J. Thiessen, member of the National Research Council, Ottawa, Canada, for the British Intelligence Objectives Subcommittee, which describes the work of the "Reich-Roentgenstelle"—a Berlin research organization for study of X-ray and other inspection methods.

Sheet metal is tested supersonically for faults by comparing the energy of the vibrations before and after passage through the metal. Any more than the normal drop in transmission indicated the presence of a fault. Tests show that a bubble only 0.000,01 mm in diameter can increase the drop a hundredfold. Slag or rust does not cause so great a drop, yet is also easily detected.

To generate the vibrations, the Reichs-Roentgenstelle used a 15-watt quartz crystal sender operating at 1,000 kilocycles. The vibrations were transmitted by means of a metal block to a narrow chamber of running water. The water makes contact with one edge of the test metal, thereby passing on the vibrations. A similar water contact at the opposite edge of the metal picks up the vibrations and forwards them to the receiver. To avoid standing waves in the test metal, the frequency is "wabbled" 100 cycles per second.

Orders for this report (PB-25556) "The Non-Destructive Testing of Materials and X-ray Protection Methods" should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C.

* *

Announce A. F. Davis Award Winners

JOHN W. PRICE, JR., of Rose Polytechnic Institute, Terre Haute, Ind., and HOWARD SANDERS, of Cornell University, Ithaca, N.Y., have been selected as winners of the $200 first prize and $150 second prize, respectively, in the 1947 A. F. Davis Undergraduate Welding Award.

"Atomic-Hydrogen Arc Welding" was the subject of Mr. Price's paper, published in the March, 1947, issue of the *Rose Technic*. Mr. Sanders' article, "Weldors in Diving Suits," appeared in the March, 1947, issue of *The Cornell Engineer*. Each of these undergraduate magazines will also receive awards of $200 and $150, respectively, for being the publications in which the prize-winning papers were printed.

* *

Speer Carbon Buys Electrode Plant

A WAR-SURPLUS carbon electrode plant in Punxsutawney, Pa., has been sold by the War Assets Administration for $500,000. Purchaser is the plant's wartime operator, Speer Carbon Co., St. Marys, Pa. The plant covers 10.4 acres.

Important ANNOUNCEMENT

THE PIONEERS of tool and die welding electrodes introduce IMPROVED Eureka line

SLAG REMOVAL is easy when you use the improved Eureka tool and die welding electrodes. As shown above, *slag lifts of its own accord* after unit has been "Eureka-welded!" Rapid separation of slag eliminates another age-old weldor's problem!

These improved Eureka mineral coated electrodes may be used for A.C. or D.C. welding. Manipulation characteristics are greatly improved.

Eureka welding can save you many man hours, conserve tools and dies and greatly reduce production delays!

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New Russian Institute Given Welding Projects

A Scientific Research Institute of Bridges, organized by the USSR as a section of the Leningrad Institute or Railway Transport Engineers, has been instructed to carry out this year a series of experiments and projects in welded bridge construction in collaboration with the Electric Welding Institute of the Academy of Sciences of the Ukraine. Altogether, 18 projects are to be worked out by both Institutes. Most important are:

(1) development of an optimum all-welded bridge construction that uses submerged-melt welding; (2) development of methods for the erection of bridges with automatically welded joints; (3) development of the technique and processes of automatic welding for seams in various positions; (4) writing of specifications for the limit thickness of steel sheets for welded bridges; (5) devising of special equipment for automatic welding in the erection of bridges; (6) devising of magnetic-particle inspection for the detection of cracks in welded seams.

★ ★

Russians Develop New Submerged-Melt Process

A NEW automatic welding process and corresponding equipment, developed by Soviet experts under Academician E. O. Paton during the war, are on the way to replacing existing equipment and accepted welding processes in the Soviet Union. As in the submerged-melt process in the United States, welding is accomplished under a layer of granular flux, eliminating the destructive oxidation and nitration of weld metal as well as the burning of carbon, silicon and manganese. Resultant welds contain from 18 to 20 times less nitrogen and from two to three times less oxygen. The strength of the weld metal is also increased as a result of the inclusion of useful alloying admixtures. Welding is accomplished at a rate of from 130 to 200 ft an hour.

Three chief types of automatic welders have been developed by Academician Paton and his assistants:

(1) "SG-8" automatic welding fixture, which operates on 4,000 amp with an electrode wire 12 mm (0.458 in.) in diameter;

(2) Automatic welding tractors, weighing 62 lb each, for the welding of ships and various articles. These self-propelled trolleys are an important landmark in the solution of the problem of converting automatic welding outfits into portable instruments;

(3) "USA-2" (universal self-propelled welding fixture), having a small engine which not only feeds the wire to the welding zone but drives the fixture, the flux apparatus and the coil of electrode wire along the seam as the weld progresses.

The new process is being successfully used to weld bridges. It is estimated that welded bridges bring a 20% saving in metal and a 40% increase in productivity of labor, as compared with riveted bridges. Last year the Soviet government decreed to build a total of 176,000 tons of welded bridges before the end of 1950.

A new process has also been developed for the automatic welding of thin-walled pipes for oil and gas mains, with a speed of over 500 feet per hour. It is proposed to combine an automatic welding machine with a roll-bending machine, and to set up a roll table for feeding the steel sheets and handling the pipes. Other applications have been found in the production of railway tank cars and pit wagons, locomotive repairs, production of high-pressure boilers, gas holders, etc.

It is intended to increase the speed of the automatic welding process, which, in the case of thin-walled vessels, is expected to reach a rate as high as 1,300 ft an hour.

* *

Oxygen to Speed Production of Steel in Open Hearths

USE of oxygen is now being initiated in the steel industry to promote chemical reactions in the open-hearth process and speed up the production of steel.

Commercial oxygen is used in the manufacture of open-hearth steel in two different ways. One is to enrich the open-hearth flame and to speed up the melt-down period. The flame temperature reached in ordinary open-hearth practice is about 3,300 F, while temperatures of 500 F or higher are attained by the use of oxygen.

Some operators have reported reduction in melt-down time by as much as 30% of normal practice time, a feat which may make necessary the redesign of furnaces and charging equipment to meet the stepped up ability of the furnaces to take metal.

The second use of oxygen is to bubble it into the molten bath and so speed up the rate at which carbon is removed from the liquid metal. Operators using this method have reported savings of 17 to 30%, depending upon the type of steel melted and the final conditions desired.

* *

B&W Produces Show on Welded Boiler Construction

DESIGNED for the purpose of acquainting engineers and students with the kind of work that goes into modern marine boilers, a new 16-mm sound film, "Steam Power for American Sea Power," shows fabrication steps at the Babcock & Wilcox Company's Barberton, O., works. This 30-minute film is available to all engineering societies, colleges and interested companies by writing: Marine Dept., The Babcock & Wilcox Co., 85 Liberty St., New York City 6.

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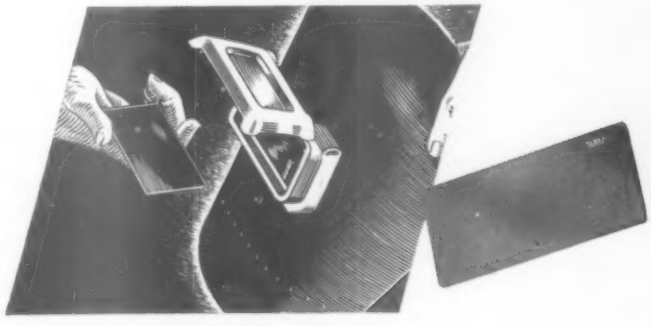

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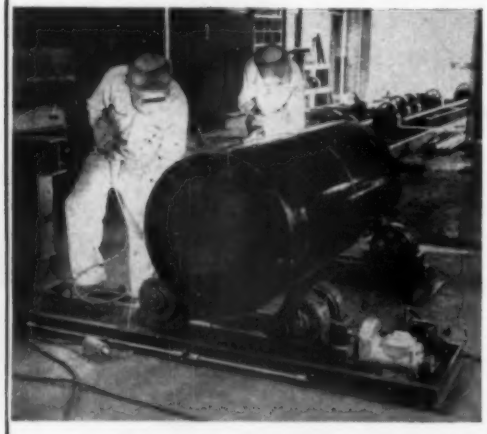

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. . . If you are welding tanks, smokestacks, pipe or other cylindrical shapes you can save precious shop room and cut down your welding time by rotating the work on Model "60" Power Turning Rolls. These units can be used for either manual or automatic welding and will soon pay their initial cost in labor savings alone.

Capacity—6,000 lbs. per set (1-power, 1-idler) Size range—12" to 12 ft. by any length
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Above prices F.O.B. Factory Shipments 3 to 4 weeks Designed and built by

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NEMA Awards Two Prizes for Welding Papers

RONALD S. WISHART, JR., a senior at Rensselaer Polytechnic Institute, Troy, N. Y., recently won the $500 prize for the best history of arc welding in a contest sponsored by the arc welding section of the National Electrical Manufacturers' Association. C. I. MacGuffie, chairman of the section and manager of sales, electric welding division, General Electric Co., presented the award to Mr. Wishart for his paper, "The Arc Triumphs," at a dinner meeting of the northern New York section of the American Welding Society.

According to the rules of the contest only one prize of $500 was to have been given. However, another manuscript submitted by HENRY WILENIUS, a sophomore at Wayne University, Detroit, received a vote from one of the three judges and it was later decided that it merited a special award of $200. The presentation to Mr. Wilenius was made by A. R. Carr, dean of the school of Engineering of Wayne University.

* *

Radiant Heating Continues to Grow

TEN years ago radiant heating was a method of space heating mentioned briefly in scientific books. Today there are upwards of 10,000 installations and nearly 1,000 new ones are being made each month, according to the A. M. Byers Co., Pittsburgh. To interpret the status of radiant heating as it is today, engineers recently surveyed 1,000 installations located in 45 states, and found them falling into these classifications.

Residential (homes ranging in price from $5,000 to $100,000) 47%; Commercial (dairies, railroads and bus stations) 28%; Industrial (manufacturing, warehousing and office structures) 16%; Institutional (schools, hospitals) 8%; Miscellaneous (airplane hangars, farm buildings, etc.) 1%.

* *

Allis-Chalmers Expands Pittsburgh Facilities

A CONSTRUCTION and expansion program at the Pittsburgh works of the Allis-Chalmers Mfg. Co. includes a 250 by 400 ft building which will be devoted largely to the production of transformers. Another smaller building at the New River plant will be used for shipping. Present employment of 1,600 at Pittsburgh will be increased from one fourth to one third and productive capacity expanded by about 50%. Construction is expected to be completed about Nov. 1.

* *

Reed Engineering Moves

DUE to increased activity in its field, the Reed Engineering Co., formerly of Webb City, Mo., has moved into a newly constructed plant in Carthage, Mo. The new location provides increased floor space for manufacturing, offices and engineering departments.

Engineering Exhibit in London, Aug. 28 to Sept. 13

ENGLAND will hold its first engineering and marine exhibition since 1937 at Olympia, London, August 28 to September 13. This show is expected to refute the story that British industry—tied by crippling controls, shortages of raw material, man power and fuel—has neither the resilience nor the initiative to weather the international marketing storms. Exhibit space will be 45% greater than in the 1937 exhibition, and every square foot of space has already been taken.

Welding, too, will reflect the considerable advances which have been made by British industry. Many up-to-date welding and cutting plants and their accessories will be displayed. A particular interesting exhibit will be a large glass tank in which divers will demonstrate underwater metal cutting by the torch method.

* *

Run Welded Gas Line between Missouri Cities

To avoid the delay of getting new materials, 12-in. pipe reclaimed from old gas and oil lines was used in construction of a new 22-mile pipe line for natural gas between Harrisonville and Independence, Mo. The sections, ranging in length from 20 to 30 ft long, were cleaned by machine-operated steel wire brushes, and the few pit holes in them were sealed with weld deposits. They were then laid in the trench dug for them and arc welded circumferentially. Two operators each welded half a joint, starting at the top and finishing together at the bottom.

* *

Standardize Cylinder Outlets for Compressed Gases

COMPRESSED GAS MANUFACTURERS' ASSOCIATION has just completed the task of standardizing valve outlets on cylinders for compressed gases. As a safety measure, this unified code aims to isolate the valves, regulators and connections for different gases so that unintentional or dangerous cross-connections cannot be made. For any one gas, however, the utmost interchangeability is preserved between connections.

Detailed information on the connections for any gas can be obtained from the Compressed Gas Manufacturers' Association, 11 W. 42nd St., New York City 18.

* *

ASME to Meet Dec. 1–5 at Atlantic City

THE 1947 annual meeting of the American Society of Mechanical Engineers will be held Dec. 1 to 5 at Atlantic City, N. J. This will be the third time in the ASME 68-year history that the society has held its yearly convention outside of New York City. Increasing hotel congestion in New York led to the decision to stage the convention at the Chalfonte and Haddon Hall hotels at Atlantic City.

STEEL TANKS CALL FOR CARBON ARC WELDING

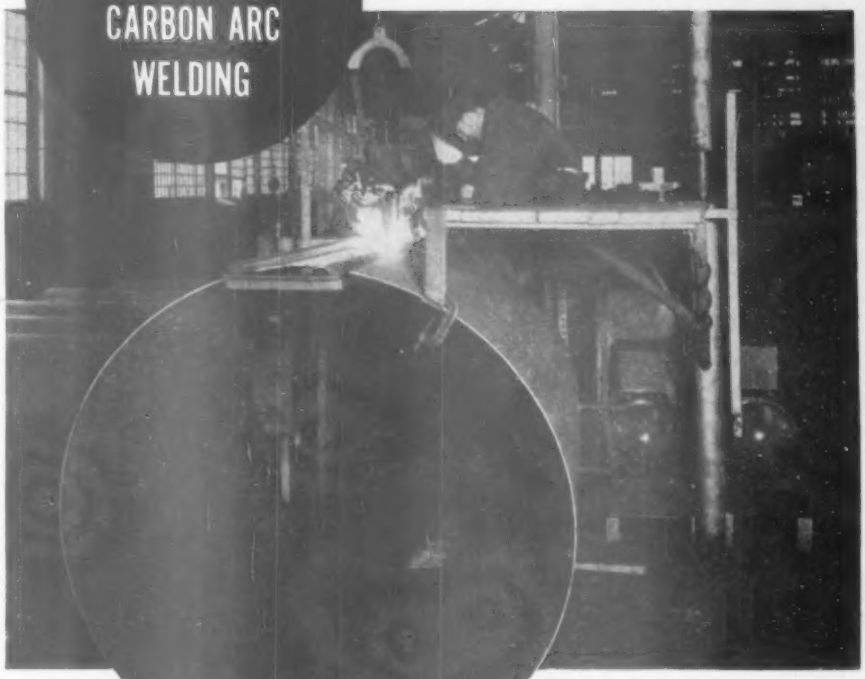

Photo courtesy of The Lincoln Electric Company

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call for **SPEER HOLD-ARK ELECTRODES**

Speed and accuracy have made automatic carbon arc welding the accepted method for fabricating large tanks, pipe sections and boilers. But strength and economy in such welding depends on the quality of the carbon electrode used.

Smooth-burning Speer Hold-Ark Carbon Electrodes have a high current carrying capacity, providing a penetrating arc high in heat value . . . and 13% more welds per inch of rod. They develop a small point with a short acute burning angle . . . and last 33% longer. They withstand the abuse of automatic welding . . . because they are 22% stronger and harder.

In spot, butt, or flash welding, in small precision work, on cutting jobs, you'll get better welds at lower cost with Hold-Ark Electrodes.

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Without a Dependable MIXER You Haven't Got a GOOD TORCH!

When a torch has a mixer that will function with dependable efficiency, using tip sizes 00 to 12 inclusive... compensating for both welding gas pressures and welding tip sizes—and one that will produce a *longer, hotter* flame, using the same gas pressures, you may be sure that *that* torch is trade-marked MECO.

Make your own comparison to prove our claims—a demonstration is all you will need.

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CORTLAND WELDING COMPOUND CO.
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Twin-Carbon Torch Can Weld Fine Wires

IN welding fine wires together, a 20 or 30 amp d-c arc between two carbons is easier and faster than oxy-acetylene or atomic-hydrogen welding, claim welding engineers of the General Electric Co. Gas welding, they say, is too slow, heats the wires too much, and does not fuse them together readily. Atomic-hydrogen welding is fast enough but is not as easy to use as the twin-carbon torch. Visibility is better with the carbon arc, and there is no burning gas envelope to heat the wires and burn the hands. Enough heat is produced, however, to permit a neat joint to be made quickly.

* *

Air Reduction Adds Two New Plants

IN order to supply increasing demands of Louisiana industry for oxygen, Air Reduction Sales Co. has opened a new plant at Baton Rouge, La. J. L. WEST, who has been with the company for over 25 years, has been named superintendent.

Another Airco plant has been opened at Decatur, Ill., and will be headed by GEORGE H. KLINGBERG, also with the company for over two decades.

* *

G-E Opens Plant for Alkyd Resins

GENERAL ELECTRIC Co., has begun manufacture of "Glyptal" alkyd resins at its newly constructed plant at Anaheim, Calif. These resins are basic ingredients for paints, enamels and weld-spatter preventatives. Anaheim facilities consist of six buildings comprising 35,000 sq ft.

* *

Industrial Exposition in California, Aug. 16–24

SOUTHERN California will hold its fourth annual industrial exposition Aug. 16 to 24 in the Pan-Pacific auditorium, Los Angeles. Manufacturers of welding equipment, industrial tools, etc. will display their products to buyers, engineers and exports from all fields of industry.

* *

Ceco Steel Opens New District Office

CECO STEEL PRODUCTS CORP., Chicago, has opened a new New York district plant and office at Hillside, N.J. This location replaces the Ceco facilities formerly located in Jersey City. It will manufacture steel joists and warehouse roof deck, reinforcing steel and other structural products.

* *

Budd Delivers First Postwar Dining Cars

THE Florida East Coast and the Atlantic Coast Line railroads recently received their first postwar dining car from the Budd Co., Philadelphia. Both cars are of welded construction and have a seating capacity of 48 passengers.

About People

E. H. VEDDER has been appointed manager of the newly formed electronic control sales section of the Buffalo division of Westinghouse Electric Corp., while R. W. STAGGS has been named manager of the electronic control sales section. Mr. Staggs will also be responsible for sales activities of resistance-welding control. Other appointments include G. B. STADUM as manager of the resistance welding engineering section and W. G. ROMAN, manager of the electronic section—a combination of the previous "Mototrol" and "electronic regulator" sections.

* *

WILLIAM A. ROBERTS and WILLIAM C. JOHNSON have been appointed executive vice-presidents, respectively, of the tractor and general machinery divisions of the Allis-Chalmers Mfg. Co. Two new vice-presidents have also been named for these divisions. They are MARSHALL L. NOEL, vice-president and general sales manager for the tractor division, and J. L. SINGLETON, vice president and director of sales for general machinery.

* *

WILLIAM G. FINDLAY has been appointed manager of the Pittsburgh plant of Joseph T. Ryerson & Son, Inc., He succeeds HOWARD L. ROBINSON, who has been given a special assignment at the company's Cleveland plant. Mr. Findlay was formerly manager of the work order department at Chicago. This post is now filled by C. W. SCHOENBERG.

* *

GEORGE B. PARKER has been named general staff manager of United States Steel Supply Company's sales department. Mr. Parker will be responsible for the administration of advertising, commercial research, market development and price policy functions of the company in its nine operating districts.

* *

HUGH J. FRASER, vice-president of International Nickel Co., Inc., has been placed in general charge of all plant operations of the company in the United States. John A. Marsh, assistant general manager of the Huntington, W. Va. works, has been named Mr. Fraser's assistant.

* *

GEORGE M. SCHURMAN, president and treasurer of National Bag Corp., has been elected a director of American Brake Shoe Co. Mr. Schurman is also a director of American Water Works & Electric Co. and other corporations.

* *

CHARLES F. YARHAM has joined the sales engineering department of the Ohio Equipment Co., Inc., Cleveland, representative for Yale & Towne Mfg. Co.

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APW No. 217 is tops for low temperature production brazing of steel, stainless steel, alloy steel, copper, brass, bronze, Inconel and monel metal. Only small amounts are needed to make clean, sound, leak-proof joints.

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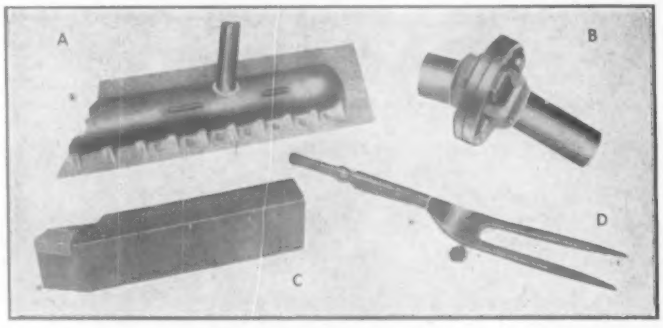

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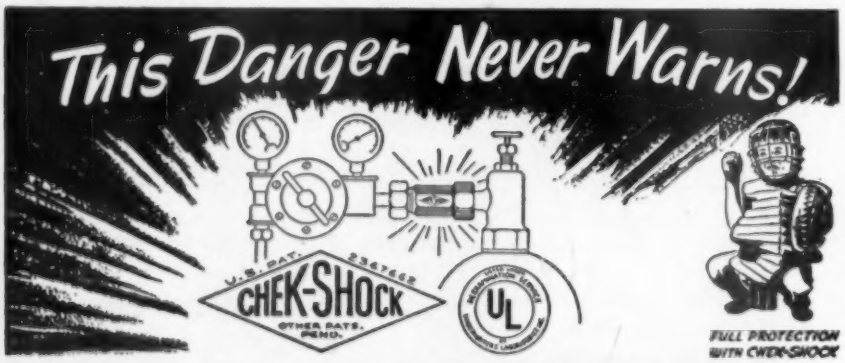

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SOFTLY controls the vicious "jolt" of high pressure oxygen gas, thus eliminating regulator repairs and preventing possible injury to operators.

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- Will increase life of regulator assembly.
- Will eliminate possible injury to operator from burstings.
- Will prevent unnecessary internal wear in regulator (*as NOT necessary to release control screw before opening tank valve*).

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#4. SCREW TYPE COUPLER . . . for removable inlet stem regulators (1/4" pipe) available in standard, light, or heavy capacities.
#5. FOR HYDROGEN . . . left hand thread coupler.

We also Make MEDICAL CHEK-SHOCKS for All Types of Medical Regulators and Tank Fittings (chrome plated) . . . $8.00 Ea.

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FOWLER, CALIF.

THOMAS COYLE has resigned as an executive board member of the Compressed Gas Manufacturers' Association, in view of his retirement from active service with E. I. Du Pont de Nemours & Co. The Board voted unanimously to elect Mr. Coyle to honorary membership in the association.

* *

R. BRUCE HUNTER has been appointed manager of the Gary, Ind., plant of American Bridge Co. He succeeds W. A. THIEL, who has been placed in charge of construction and maintenance of the company's western division plants at Gary and Minneapolis.

* *

HERMAN F. DOBSCHA, superintendent of blast furnaces, Edgar Thomson Works, Carnegie-Illinois Steel Corp., Pittsburgh, has been awarded the American Iron and Steel Institute Medal for his paper "Effect of Sized and Nodulized Mesabi Iron Ores on Blast Furnace Performance."

* *

WALTER H. GEBHART, first vice-president, Henry Disston & Sons, Inc., Philadelphia, has been elected president of the American Supply & Machinery Manufacturers Association. He succeeds THEODORE F. SMITH, president of Oliver Iron & Steel Co., Pittsburgh.

* *

WALLACE B. HUNTER has joined American Bridge Co. as senior contracting manager of the Chicago district. Mr. Hunter will be in charge of all contracting work of the company in the Chicago district, including the sub-office at Gary, Ind.

* *

J. LESTER PERRY, formerly assistant to Benjamin F. Fairless, president of U. S. Steel Corp., has been elected president of Columbia Steel Co., west coast subsidiary of U. S. Steel. He succeeds the late WILLIAM A. ROSS.

* *

RALPH V. DAVIES has been appointed vice-president and general sales manager for Aluminum Company of America. He succeeds GEORGE J. STANLEY, retired. Also named vice-presidents of the company are: ROBERT B. MCKEE and DONOVAN WILMONT.

* *

RICHARD T. SPEAR has been appointed a regional sales manager for All-State Welding Alloys Co., Inc. His territory includes eastern Pennsylvania, south New Jersey, Virginia, W. Virginia, Delaware, Maryland and the District of Columbia.

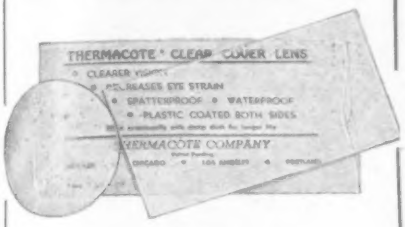
* *

JACOB S. DISSTON, JR., has been elected president of Henry Disston & Sons, Inc., Philadelphia. He succeeds S. HORACE DISSTON, who has been named chairman of the board.

* *

EDWIN M. OTT has been named assistant manager of market research for the Pennsylvania Salt Mfg. Co., Philadelphia.

PREFERRED BY ALL WELDERS WHO KNOW THEM



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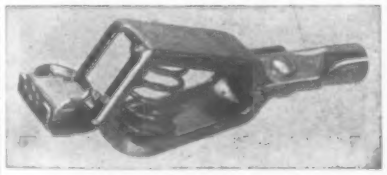

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Grips any surface with a 65 lb. bite. 300 Amp. capacity.

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H. L. PEHRSON, formerly with the Reading Pratt and Cady div. of American Chain and Cable Co., has been named west coast sales manager for Ladish Co., Wis. His offices are at 714 W. Olympic Blvd., Los Angeles 15.

* *

H. B. WALTERS has been named works manager of the Allis-Chalmers Mfg. Company's Boston works. He was formerly assistant works manager at the company's Pittsburgh plant.

* *

L. J. AMSDELL has been promoted eastern sales manager for Acme Rubber Mfg. Co. He will make his headquarters at the company's New York offices in the Woolworth Bldg., 233 Broadway.

* *

RICHARD E. ROBERTS, formerly director of employee relations for the Fisher Body division of General Motors Corp., has joined the Ford Motor Co. as director of the community relations department.

* *

W. E. MULLESTEIN has been appointed field sales manager for Lukens Steel Co. and subsidiaries. He succeeds Arthur J. O'Leary, recently deceased.

* *

HAROLD A. HINTZ has been appointed Pacific Coast sales manager for H. K. Porter Co., Pittsburgh. Mr. Hintz is located in the Petroleum Building, Los Angeles.

* *

LAWRENCE H. BAILEY has been awarded the annual Stevens Institute of Technology Medal for outstanding achievement in the field of powdered metallurgy.

* *

WILLIAM B. ANDERSON has been appointed manager of the aviation gas turbine division of Westinghouse Electric Co., Pittsburgh.

* *

M. J. VOLLMER, assistant secretary and treasurer of A. O. Smith Corp., has been elected to the company's board of directors. He replaces JOHN LEEKLEY, resigned.

* *

WILLIAM P. DRAKE has been appointed assistant vice-presdient of the Pennsylvania Salt Mfg. Co., Philadelphia.

* *

JOHN C. CUSHING has been appointed director of industrial relations for U.S. Steel Supply Co., Chicago. He succeeds J. W. B. FORINGER, resigned.

* *

ROBERT P. NICHOLS has been appointed assistant domestic sales manager for R. G. LeTourneau, Inc., Peoria, Ill.

* *

JOSEPH M. WELDON has been appointed assistant vice-president to H. J. French of the International Nickel Co., Inc.

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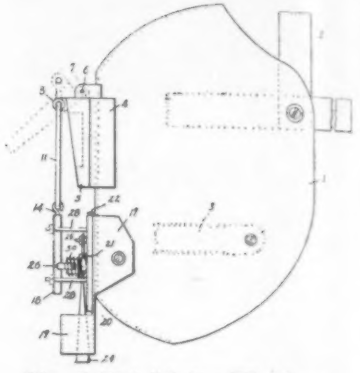


Head Shield for Weldors

2,420,619. JOSEPH F. RAKOS, Cleveland, O., assigned one-half to JOHN W. NELSON, Cleveland. Filed Dec. 14, 1945. Issued May 13, 1947.

A head shield comprising a window hinged to a foundation member by a hinge pin, a coiled spring in torsion on the hinge pin, a transverse member connected to the upper edge of the window, a bail having its ends mounted in bores in the transverse member, a window-lifting member hinged to the bail, a back plate having a guide-way, a stop positioned at the upper end of the guide-way, an adjustably mounted stop positioned in the guideway at its lower end and a carrier member slidably mounted in the guideway and limited in its movement up and down by the stops therein. A releasable lifting member is mounted in the carrier member and a manually operable lever is pivotally mounted on the back plate laterally of the guide-way. Inclined planes positioned laterally of the guideways cause the releasable lifting member to move relative to the carrier member to release the window-lifting member from its controlling influence. This allows the coiled spring in torsion on the hinge pin to close the window. A helical spring connected to the manually operable lever and the back plate is adapted to return the lever and the carrier member to their initial position.

★ ★

Welding Stud

2,413,370 WALTER E. PALMER, Fair Lawn, N. J., assigned to HOLLUP CORP., Chicago, Ill. Filed May 24, 1944. Issued Dec. 31, 1946.

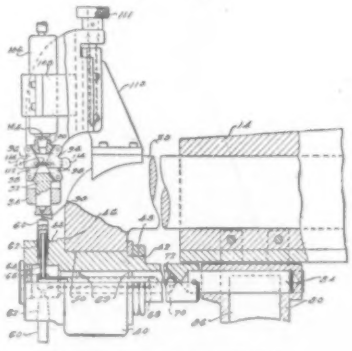
A stud adapted to be welded to a metal plate. It terminates in a point, having a portion of reduced diameter beyond the threaded body portion. A ring of fluxing material encircles the portion of reduced diameter and above the terminal part; the fluxing material flows over molten metal formed by the melting of the reduced portion and a portion of the plate to which stud is welded.

Dip Brazing Aluminum

2,417,662. JOSEPH G. ROSALES, Los Angeles, Calif., assigned to THE GARRET CORP., AIRESEARCH MANUFACTURING CO. division, Los Angeles. Filed Jan. 1, 1945. Issued March 18, 1947.

A method of brazing a core assembly of aluminum tubes with enlarged ends. The core assembly is dipped in a flux and then in a filler metal. The steps are: heating the core assembly to a temperature of about the melting point of the filler metal but lower than the melting point of the aluminum; dipping the lower end of the core assembly in molten flux at a temperature above the melting point of the filler metal and maintaining it in the flux for about twenty seconds; removing the end from the flux; dipping it into molten filler metal at a temperature above the melting point of the filler metal to a depth less than the length of the tube ends and for a period of time corresponding to the range of five to ten seconds; removing the end from the filler metal with a shaking motion so as to dislodge excess filler metal from the dipped portion; dipping the other end first in the molten flux and then in the molten filler metal; cooling the core assembly in a manner to avoid rupture of the brazed joints; removing the adhering flux from the brazed core assembly.

★ ★



Multiple Spot Welder

2,419,817. CHARLES BRUNO, Highland Park, Mich. Filed Sept. 13, 1943. Issued April 29, 1947.

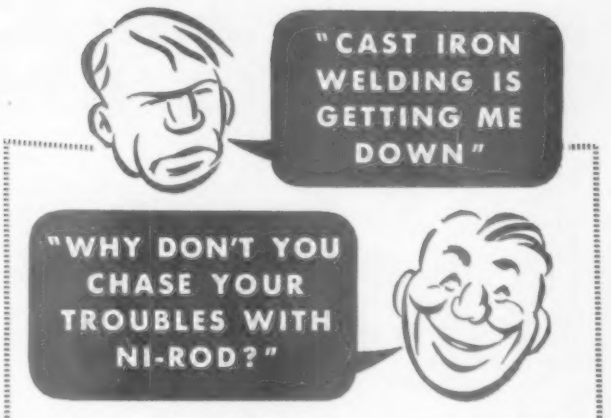
In a spot welder, an electrode-supporting member having means adapting it to support a plurality of electrodes. The member is movable between several positions; each movement from one position to another moves one electrode to a working position and moves another electrode to a dressing position. Means is carried by the welder for effecting a dressing operation on the electrode engaged at dressing position.

★ ★

Spot-Welding Electrode

2,418,781. GEORGE E. LEWIS, Detroit, Mich. Filed July 17, 1944. Issued April 8, 1947.

A spot-welding electrode having a socket engaging a replaceable tip. A cam and a bearing within the socket, one on the tip and the other on the socket are adapted to coöperate with the tip is rotated in order to force it outward from the socket.



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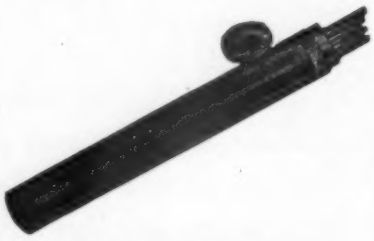

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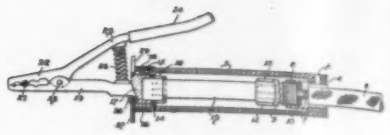
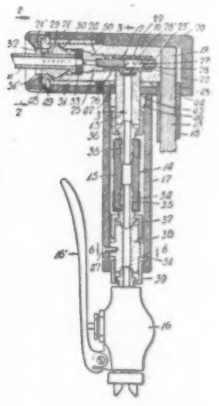


Electrode Holder

2,419,152. KARL J. MOSEBACH, Pittsburgh, Pa. Filed Jan. 11, 1945. Issued April 15, 1947.

An electrical connector comprising a tubular body having one end partly closed by a bushing through which a cable conductor may extend, a screw-threaded bushing secured in the other end of the tube, engages a screw plug which carries a means for detachably engaging an electrical conductor. A fuse-holding clip is carried by the inner end of the plug. A screw-threaded coupling socket, of smaller external diameter and having abutting engagement with the inner edge of the screw-threaded bushing, has a hole through its end wall through which wires from the cable may extend. A coupling plug having threaded engagement with the coupling socket serves to clamp wires against an inner wall surface of the coupling socket. The coupling members are removable from the tubular body when the first-named plug is removed.

★ ★



Arc-Oxygen Cutting Torch

2,417,650. CHARLES KANDEL, Jackson Heights, N.Y. Filed Feb. 2, 1945. Issued March 18, 1947.

An arc-oxygen cutting torch, comprising an electrode holder, a cable connected thereto, an oxygen conduit having an insulating section of flexible tubing, a rigid insulating handle and a gas-control valve. The latter is beyond the handle and is insulated from the holder by the insulating section of the conduit.

★ ★

Duplex Welding Hose

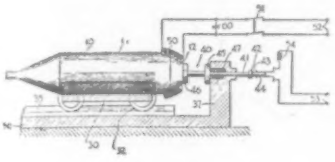
2,420,221. CHARLES J. BELL, Chicago, assigned to THE GATES RUBBER CO., Denver, Colo. Filed Oct. 8, 1945. Issued May 6, 1947.

A duplex welding hose having two tubes enclosed in a continuous cover of rubberlike material. A series of longitudinal ribs on substantially one-half of the cover and a smooth surface on the other half enable the hoses to be distinguished by touch alone.

Induction Brazing Coil

2,418,056. HAROLD A. STRICKLAND, JR., Detroit, Mich., assigned to THE BUDD CO., Philadelphia. Filed Aug. 13, 1943. Issued March 25, 1947.

This brazing apparatus includes an induction heating coil positioned with its axis approximately horizontal and means for supporting a ferro-magnetic workpiece for reciprocating movement into and out of heating position. A work-release means, adapted to engage the workpiece when it is in position to be heated, tends to force the workpiece out of heating position. When the coil is energized, the workpiece is held in heating position against the force of the work-release means.

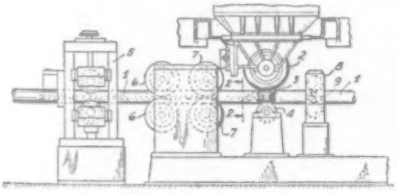


* *

Butt Welder

2,417,594. JEAN R. FLECHE, Youngstown, O., assigned to REPUBLIC STEEL CORP., Cleveland. Filed Feb. 11, 1944. Issued March 18, 1947.

A resistance butt welder having a frame, a tube-welding throat defined in part by rolls and in part by a pair of rotary electrodes, shafts projecting at right angles from the electrodes at their centers of rotation, brackets secured to the frame, bearings in the brackets to receive the rotatable shafts of the electrodes, and means operatively associated with the brackets to position the planes of the electrodes at acute angles to the longitudinal axis of a tube in the throat.

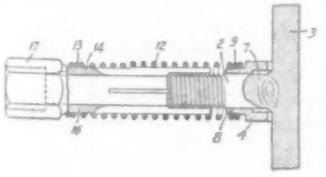


* *

Ferrule Stud Welding

2,416,204 TED NELSON, San Leandro, Calif. Filed November 19, 1943. Issued February 18, 1947.

A ferrule for use in welding a stud to a plate, comprising a sleeve having a bore. One end of said bore is only enough larger than the stud to permit it to pass freely over the latter. The other end of the bore is enlarged to provide a narrow peripheral molding chamber around the welding end of the stud. The wall of this chamber is vented by a plurality of openings.



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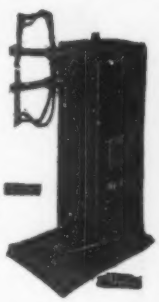

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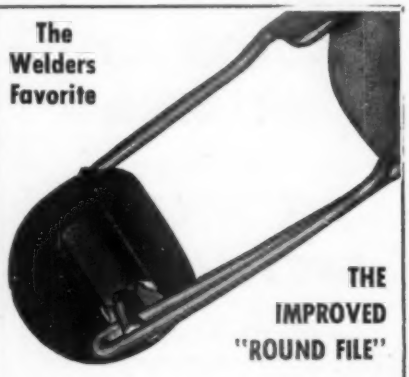

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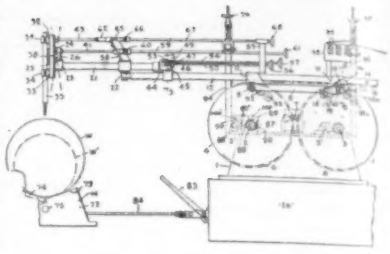
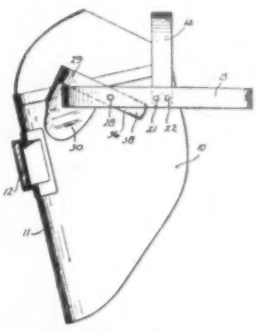


Torch Cutting Machine

2,419,983. James L. Anderson, Closter, N. J., assigned to Air Reduction Sales Company, Inc., New York City. Filed June 18, 1943. Issued May 6, 1947.

A cutting machine comprising a pair of rotary discs, each having gear teeth around part of its circumference. A motor-driven pinion meshes with the teeth on both discs to rotate the discs in the same direction and at the same speed. A horizontally maintained connecting rod is moved in an arcuate path during rotation of the discs. A horizontal bar, carried by and extending forwardly from the connecting rod supports the torch holder. The connecting rod may be adjusted longitudinally with respect to the connecting bar.

★ ★



Weldor's Mask

2,419,649. Leo Lieg, Clintonville, Wis. Filed March 26, 1945. Issued April 29, 1947.

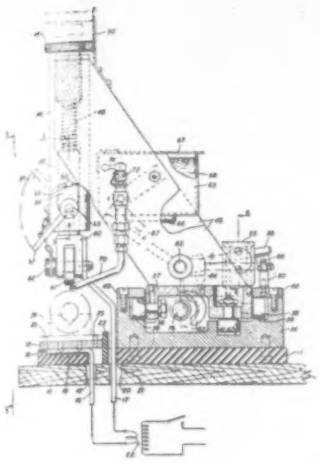
In a protective mask, a supporting head band, a pivoted face shield, and an auxiliary frontal band mounted on pivots spaced forwardly symmetrically of the mid-points of the head band. Tangential lever members integral with the auxiliary band extend rearwardly and outwardly from the pivot elements and bear frictionally against the inside of the face shield.

★ ★

Antifogging Composition

2,416,051 Richard L. Gilbert, Jr., Old Greenwich, Conn., assigned to American Cyanamid Co., New York City. Filed June 3, 1943. Issued February 18, 1947.

A method of inhibiting the formation of fog on lenses by coating them with a thin anti-fogging film. The composition contains a triester of sulfotricarballylic acid with an aliphatic alcohol of 4-8 carbon atoms acting as the principal anti-fogging agent. The film exhibits its original fog-inhibiting properties after the coated lens has been dipped in water.



Seam-Welding Apparatsu

2,418,951. Samuel Pitt, Westfield, and Daniel Vaughn Waters, Flemington, N. J. assigned to Western Electric Company, Inc., N. Y. Filed June 29, 1944. Issued April 15, 1947.

A welding apparatus comprising a support for an article to be welded and a circular electrode carried by a movable carriage. The carriage is connected to a reversible power means to cause reciprocation of the electrode to weld different portions of the articles. There is also a separate means movable with the carriage to apply an inflammable material to the article in advance of the electrode, to cause burning of the oxide coating on the article in advance of the welding operation.

* *

Underwater Torch Lighter

2,418,631. David F. Geiger, Los Angeles, Calif., assigned one-half to Glenn C. True, Long Beach. Filed Nov. 8, 1943. Issued April 8, 1947.

A subaqueous torch lighter with a normally closed cylindrical casing having an ingress duct for propelling fluid under pressure exceeding the pressure of the water and a valved egress duct. A generating means in the cylindrical casing is actuated by the release of pressure of the fluid through the opening of the valved egress duct. The cylindrical casing has an orifice in proximity to the spark-generating means, which in turn has a valve normally closing the orifice. This valve is opened automatically by the actuated movement of the spark-generating means, releasing a stream of the lighter fluid accompanied by the igniting sparks into the water.

* *

Adjustable Headband

2,419,661. Werner I. Staaf, Rennerdale, Pa. Filed Oct. 21, 1944. Issued April 29, 1947.

A headgear having a head band with opposed end portions received in a housing that contains a pair of oppositely curved coils, each coil extending along one of the end portions. There is a means on each end portion to engage the convolutions of the coil which extends alongside it and means for rotating the coils.

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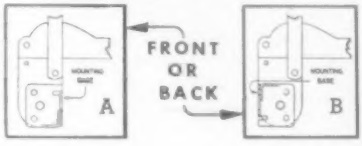

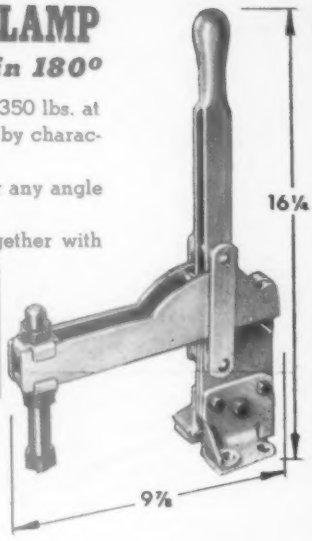

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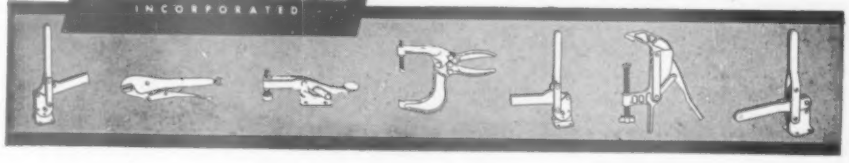

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- No. 5 Aluminum Flux for Cast Aluminum
- No. 8 Aluminum Flux for Sheet Aluminum
- No. 9 Stainless Steel Welding Flux
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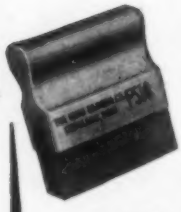

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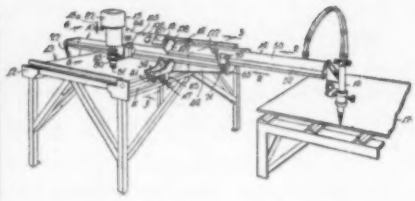


Flame-Cutting Machine

2,417,511. Chester Mott, Evanston, Alfred F. Chouinard and John F. Dove, Chicago, assigned to National Cylinder Gas Co., Chicago. Filed Nov. 10, 1943. Issued March 18, 1947.

A flame-cutting machine of the type having a movable carriage with a cutting torch at one end and a motor driven propelling device at the other. This machine is characterized by two pairs of parallel horizontally spaced rails, one pair forming a part of the support and the other pair forming a part of the carriage. The rails of the carriage are disposed above and parallel to the rails of the support, and each rail has inclined upwardly and downwardly facing surfaces. The carriage is provided with rollers having inclined axis engaging the upper and lower inclined surfaces of the rails of the support.

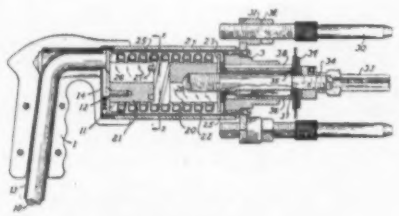
* *

Electrode Holder

2,418,681. Martin Wells, Los Angeles, Calif. Filed Feb. 5, 1945. Issued April 8, 1947.

In an electrode holder, the combination of a body having a lateral opening to receive a welding rod and an axial opening to receive a clamping screw. There are internal screw threads in the axial opening, spaced from the lateral opening, and an annular guard wall between the the internal threads and the lateral opening. The clamping screw has an externally threaded portion engaging the internal threads and a pin portion projecting through the guard wall to engage a welding electrode placed in the lateral opening. The annular guard wall fits around the pin relatively close so as to serve as a barrier to the passage of particles from the lateral opening to the internal threads.

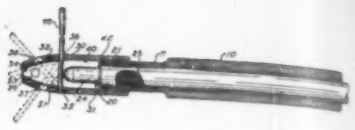
* *



Stud Welder

2,416,954 Herbert S. Remmer, Oakland, Calif., assigned to Ted Nelson, San Leandro, Calif. Filed February 26, 1945. Issued March 4, 1947.

In a gun for welding a stud within an enclosing ferrule, a chuck for carrying the stud; a sleeve surrounding the stud chuck and means for adjusting the sleeve axially relative to the stud chuck. A dielectric bushing is inserted between the sleeve and stud chuck, and a collet on the sleeve carries the ferrule.



Electrode Holder

2,419,560. Percy Jepson, Oakland, Calif. Filed April 21, 1944. Issued April 29, 1947.

An electrode holder with a tubular handle and a conducting member fitting into the forward end of the handle. A contact stem on the front end of the conducting member has a plurality of frustoconical surfaces of successively decreasing angles of taper. A tubular shell connected with the handle has a plurality of apertures adapted to selectively receive an electrode and to hold it in contact with a selected surface on the stem in any one of a plurality of angularly disposed positions.

* *

Electrically Controlled Shield

2,417,883. Samuel Oschin, Detroit, Mich. Filed Dec. 15, 1943. Issued March 25, 1947.

A protective shield for use in connection with a welding circuit. Juxtapositioned lenses are supported on the shield for relative rotation in opposite directions; in one position they permit substantially free passage of light rays and in another position practically block the passage of light rays through the shield. A control circuit including a double acting solenoid is operatively connected to the lenses to move them between the two positions. The control circuit is energized in response to opening and closing of the welding circuit.

* *

Stud Welder

2,416,454 William Morton and Ray M. Murray, Jr., Seattle, Wash. Filed November 22, 1943. Issued February 25, 1947.

A welding gun comprising a supporting body, a chuck reciprocably supported, a solenoid coil having an electrical connection to the chuck, and a core part disposed within the coil's magnetic field and connected for conjoint reciprocation with the chuck. The solenoid coil, is mechanically interposed between the body and the chuck, which drives the latter outwardly from the body upon discontinuance of the welding current. When the current is on, the attraction of the core part draws the chuck inwardly towards the supporting body.

* *

Butt Welding Machine

2,419,921. Floyd E. Taylor, Birmingham, Mich., assigned to Swift Electric Welder Co., Detroit. Filed April 16, 1945. Issued April 29, 1947.

In butt welding machine, the combination with a bed formed of electrically conductive material and clamping electrodes mounted thereon to be movable towards or from each other. Insulation is provided between the bed and one of the electrodes.